CENTRE INTERNATIONAL DE LA CONSTRUCTION EN TERRE
INTERNATIONAL CENTRE FOR EARTH CONSTRUCTION

Disaster Friendly Low Cost Houses Project at Bangladesh

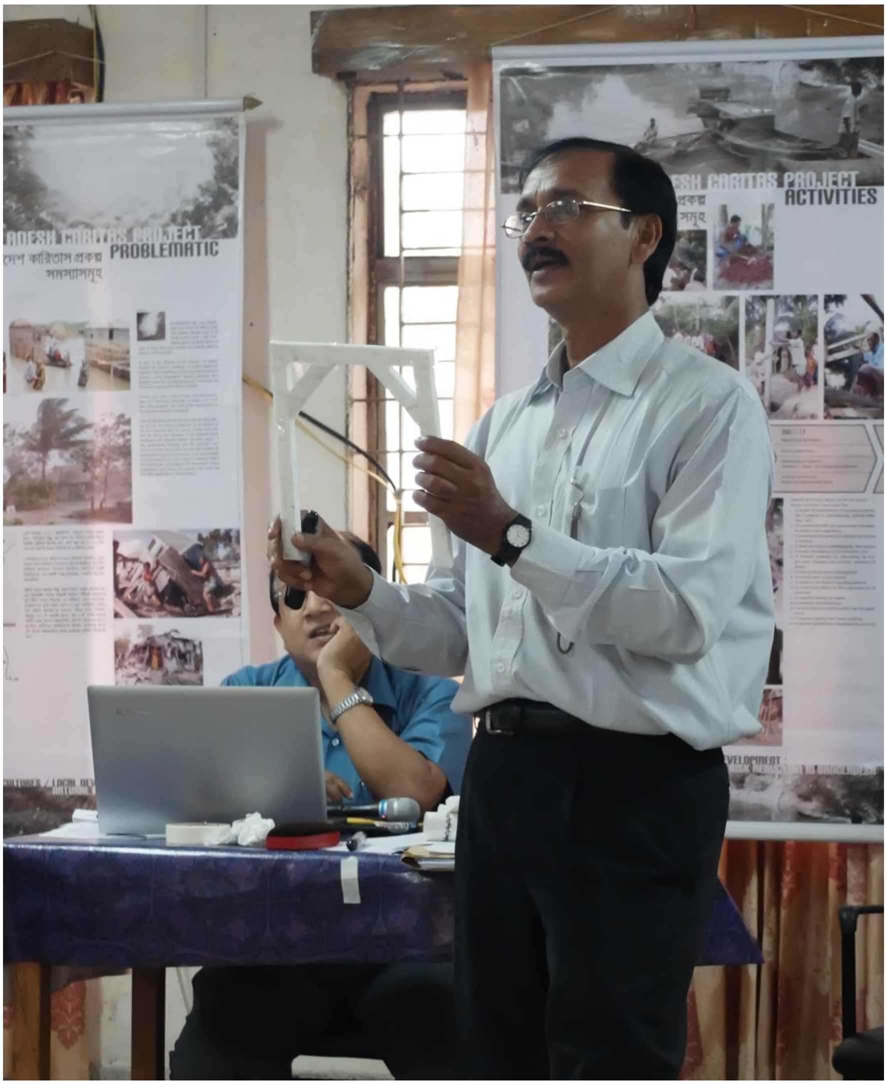
Project synthesis
&
Differents tools produced all along the project (2007 – 2019)

Ref CRAterre: BDG011

Olivier MOLES

CRAterre
BP 53
Maison Levrat, Parc Fallavier
2, Rue de la Buthière
38092 Villefontaine Cedex, France

Tél. : +33 (0) 474 95 43 91
Fax : +33 (0) 474 95 64 21
craterre@club-internet.fr
www.craterre.org
SIRET 333 824 852 00029



Acknowledgements

First, we would like to thank Ms. Shiba Mary D'Rozario - Public Relations Caritas Bangladesh - for her warm welcome and the perfect way in which she organized the logistics of this mission.

We wish to thank again the all teams of Caritas Bangladesh for their continuous commitment on the project, and in particularly Mr Ratan Kumar Podder which who we are working in this project since more than 10 years now.

Special thanks to BUET Team, for the quality of their work and their availability.

Thank you to Mr. Pablo Haro Perez and Ms Carole Lory, from Secours Catholique / Caritas France for their support and having shared your ideas and reflections.

Last, a heartfelt “thank you” to the people that we met and interviewed locally – thank you for taking the time to answer our questions.

Danial Dhritu Snal; DM, Sylhet

Tomas Hambrom; DM, Sylhet

Abu Taher; DM, Chittagong

Abdus Salam; DM, Dhaka

Ashim Mankin; DM, Mymenshingh

AJM Mazharul Islam; DM, Chittagong

Litan Gomes; DM, Dhaka

Bhuton Marandy; FCDRR, Dinajpur

Nirunkush Chiran; SCDRR, Mymenshingh

Chanda Hawai; DM, Mymensingh

Abu Taher; FCFPP, Sylhet

Albino Nath; urban DRR, Khulna

John Swapan Gomes; DM, Dhaka

Hubert Sony Ratna; DM, Khulna

James Costa; DM, Rajshahi

Faridul Islam; SCRDF, Rajshahi

Nazmul Hossen; MDFLCH, Sylhet

Paritosh Chakrabarty; DM, Barisal

Moni D’ Rozario; SCDRR, Barisal

Arook Tappa; SWCD, Rajshahi

Amar Krisna Sharma; DM, Central Office

Tapash Sarker; DM, Khulna

Ujjal Ekka; DM, Dinajpur

Danial Sipu Gomes; DM, Chittagong

Ratan Kumar Podder; Central Office

Prof. Tashin Reza Hossain, BUET

Prof Mohammad Shariful Islam; BUET

Jatin Murmu; DM, Mymenshingh

Acronyms

ANR	French Ministry of Research
BDT	Taka, Money in Bangladesh
BRAC	University, Bangladesh
BUET	Bangladesh University of Engineering and Technology
BUET-JIDPUS	Bangladesh University of Engineering and Technology -Japan Institute of Disaster
Prevention &	Urban Safety
CARlux	Caritas Luxemburg
CB	Caritas Bangladesh
CBO	Community Based Organization
CGI	Corrugated Galvanised Iron
CHF	Common Humanitarian Fund
CMDRR	Community Managed Disaster Risk Reduction
CRAterre	The International Centre for Earthen Architecture
DMD	Disaster Management Director
ECHO	European Civil Protection and Humanitarian Aid Operations
EDM	Entrepreneurs Du Monde
ENSAG	National School of Architecture of Grenoble
GO	Governmental Organisation
IFRC	International Federation of Red Cross and Red Crescent
LCH	Low Cost Housing
MS flat bar	Mild Steel flat bar
NGO	Non Governmental Organisation
PC	Project Committee
PIC	Community persons
PLCH	Pilot Low Cost Housing
RCC	Reinforced cement concrete
RDRT	Regional Disaster Response Team
SC-CF	Secours Catholique -Caritas France
UNESCO	Organisation des Nations unies pour l'éducation, la science et la culture
UNHCR	United Nations High Commissioner for Refugees

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1 General project information’s

1.1 Goal and Objective of the Project

Project Goal: Disaster vulnerable households living in Low Cost Houses (LCH) need to reduce the impact of disasters on their houses.

Specific Objective: Disaster vulnerable households need to use better construction techniques that are adapted to resist to a specific disaster.

Result 1: The technical designs and facilitation guides of disaster friendly and affordable LCH are ready for integration and dissemination.

Result 2: The disaster vulnerable poor community constructed disaster friendly affordable LCH.

1.2 Introduction to the differents documents presented in annexes of this report

All along the project, CB and BUET developed some research, tolls and methods according to the needs of the ongoing activities. The aim of the following compilation is to save these materials as they can be at the disposal of CB and its partners in the future.

Annexe 1 Project presentation

CB developed a comprehensive document to share about aim, activities results of the whole project process. This material cans be a good support for sharing about the approach with potentially interested actors in the field of disaster response or risk reduction. This material can also be a good resource to document presentation for conference, article, and scientifics paper.

Annexe 2 Site analysis by CB in different region of Bangladesh

In most of the region where CB is active, a study was developed I n order to assess the existing local practices regarding the housing sector. Of course, these analysis are not covering the whole particular existing context in every region. But it will be already a base for new persons to be committed to work on the theme of shelter and disaster in the concerned region.

Annexe 3 Cases study LCH

In order to communicate about the project, CB interviewed some families involved in LCH projects. This material can be used to illustrate the project results at local / individual level.

Annexe 4 Methodology for LCH design (community led design)

During the process, BUET develop a strategy and some methods to achieve community led design. They conceptualized it in a very simple and clear sketch. This one could be used to share and discuss with persons interested with the concept (humanitarian actors, students …)

Annexe 5 Some innovation promoted during the project

In order to help partners and interested individual or organisations to understand easily the technical outcome achieved through the project process, CB develop a comprehensive poster to show innovations that came along the project implementation.

Annexe 6 On-site training. Objectives and applications

Because there is some turn other in CB staff, this is necessary to explain to new recrue about some of the principle applied in the process. Some basic training material were developed regarding the topics of “on site training”.

Annexe 7 Capacity mapping for implementation of LCH

One challenge CB is facing while a disaster occur in a particular area in Népal is related to how to size adequally the response, this according to the scale of needs compared to the localy existing resources. What can be achieved localy and what are the necessary external support. In order to prepare itself of such challenge, CB did a regional assessment regarding existing capacities in term of material, tools, human resources, etc. And discuss this according to differents size of disaster (from few to very numerous household affected). These datas may evolved in the future, but it will be a good base to analyse the challenge and to imagine response that will privilege positive impact in the local economy.

Annexe 8 Community led beneficiaries’ selection

CB is very often facing the challenge of selecting beneficiaries’ families amongst a community. In order to help new staff to easily understand the community led process they developed for this purpose, they design a simple pictorial report that can be share with staff and community and make clear for all the way this process will work.

Annexe 1 Project presentation

Project Title:

From local building practices to vulnerability reduction: A seven year project in Bangladesh enhancing building resilience through existing resources, knowledge and know-how

Background Information/Project Location

The project is based in Bangladesh (23.7000° N, 90.3500° E)

With an estimated population of 142.3 million (*Preliminary Census 2011*) and over than 1050 inhabitants/km², Bangladesh is one of the most densely populated countries in the world, while also being one of the poorest countries in Asia 25.6% (ref: BBS) of the country population still lives below the international poverty line.
Geographically, Bangladesh is one of the most disaster prone countries in the world due to its geographical location. It is a flood plain of Brahmaputra-Ganges-Meghna. Floods, cyclones, tidal waves, landslides, tornadoes, riverbank erosion, drought and earthquakes are very common hazards. Due to climate change, occurrence of natural disaster is increasing significantly and new hazards-water logging, cold wave, salinity etc. are adding to the misery of the people. It is believed that in the coming decades the rising sea level alone will create more than 20 million climate refugees (http://www.grida.no/publications/vg/climate/page/3086.aspx).

Shelter is one of the vulnerable sectors during floods and cyclones in Bangladesh. Damage and loss of shelter due to disaster in Bangladesh is very high in compare with other sector. After disaster, different agencies in Bangladesh construct different types of shelter under their disaster response (Low Cost Housing – LCH) programs. Some are very costly and strong; whereas others are very nominal and temporary (https://www.sheltercluster.org/sites/default/files/docs/post-cyclone_sidr_family_shelter_construction_in_bgd_final_version.pdf, page - 59-64).

However, in most cases, after the construction of external agency led houses, it is rare that the community could replicate the same design. On the other side there is a gap among the responding agencies to have effective/contextual design and technology and easy to replicate design of LCH.

Part of this gap came because research and education related to housing do not reflect the reality of the LCH. In Bangladesh only 1% of all the research in the housing sector focus on non-engineering Kuthca houses, while more than 80% of inhabitants are living in such houses. It is considered that such houses, even if not affected by natural disaster, need to be replaced every 10-15 years.

It is true that every community have their own resilience and coping strategies for housing. Of course, these strategies significantly differ from one region of the country to the other. Each community has its specific local knowledge related to local risks, natural resources and people’s lifestyle and culture.

The project, co-implemented by Caritas Bangladesh (CB; www.//caritasbd.org), Bangladesh University of Engineering and Technology (BUET; www.buet.ac.bd/) and the International Centre for Earthen Architecture (CRAterre; http://craterre.org/), aims to develop a methodological approach in order to allow an understanding of local knowledge and building practices for housing improvement as well as LCH construction (post disaster response). At the same time and in order to achieve its goals, project emphasized on community led approach. Local population participated in design development and implementation stages.

Project description:

When did the project commence?

The project started in 2009 based on previous CB experience in the housing sector (from 1970 to 2008).

Who initiated the project?

The project triggered following the recommendations of evaluation report of the CB housing project in 2008 after the hit of cyclone Sidr 2007.

A pilot phase, from 2009 – 2010, were initiated by CB, with technical and methodological support of BUET and CRAterre. Financial support came from Secours Catholique -Caritas France (SC-CF; www.secours-catholique.org).

A second phase (2011 - 2015) was co-implemented by CB, CRAterre and BUET, with financial support of SC-CF, Caritas Luxemburg (CARlux; www.caritas.lu/),French Alliance in Bangladesh (http://www.ambafrance-bd.org/Alliances-francaises-of-Chittagong), French Ministry of Research (ANR; www.agence-nationale-recherche.fr/).

What is the main purpose of the project? What are its aim and objectives?

CB, as a human development organization, has been constructing shelters i.e. Low Cost Houses (LCH) for disaster-affected families since 1970 (all together about 443, 400 houses have been built by CB).

But, before 2008, only one particular model-house design was prepared by CB for all areas of Bangladesh. Some modifications were done from time to time, considering disaster, geographical areas and cultural aspects. Community peoples' opinions were sometimes taken into considerations for design and architectural details. But this was not done systematically.

Project main objectives:

The project aims to improve disaster resilience of LCH for different geographic regions of Bangladesh.

Project specifics objectives:

Project specific objectives are to develop/improve disaster resilient LCH for different disaster situations in different locations of the country through peoples' participation using local building materials, local available know-how involving local practices and culture. Quick disaster response has also been addressed.

Project expected results:

A systemic methodological approach on community led design solutions regarding housing project has been tested and validated. This approach and the evolved designs, in total 35 in numbers, have been documented and disseminated among the key actors in the housing sectors of Bangladesh.

Strategies for training and mass awareness are defined.

Caritas Bangladesh endorses the global approach and improves its housing disaster capacity response through adequate Disaster Risk Reduction and Disaster Response Programs.

BUET as an educational institute endorses the global approach and start to share it through their teaching program, curriculum development and research activities.

Project activities:

The project is implemented following an iterative approach on the basis of complimentary activities-collecting local information, analysis, design, implementation, evaluation and dissemination- fostering greater project flexibility and partners' capacity building, through the involvement at all stages of local communities, the implementing agency and the academic institutions. The focus is on solutions that privilege the use of local resources both for knowledge, construction, implementation and management to ensure maximum benefits from invested funds at local level. Furthermore, the project pays a special attention to economic accessibility issues so that duplication is possible for a great number.

The project constructed specific models for a particular selected area. Appropriate community led approach were adopted all along the project in order to secure appropriateness of solution developed. The adequacy of all developed models has been scientifically checked by BUET.

Models included:

- Demonstration of improved Safer Houses. The aim is to demonstrate the safer houses those low-income people can afford. Design takes benefit from the strength of existing local building culture and includes technical improvement to answer identified weaknesses.
- Disaster shelter response prototype. Designs are respecting Sphere Standard for shelter and fit with the targeted budget agreed amongst agencies involved in post-disaster response. These shelters are core houses that can be improved to become *Safer House*. If not possible they are designed for its component to be reusable for final *Safer House.*
- A component on house repair and improvement. Population is invited to visit and understand the models houses under the project. Then, a door to door assessment of beneficiaries' housing condition is done and a consensus with all stakeholders is made to reach a decision on what will be done to help the beneficiaries' houses to be improved.

In order to ensure local capacity building regarding the whole project approach, activities have been implemented step by step, with first phase handled by international and national expertise, then an appropriation phase was handled by national and Regional Staff of CB. Finally, a consolidation phase was implemented at level of local staff.

After completing the appropriation of methodological approach regarding assessment and community-led houses design, local and regional staff were asked to develop contingency plan to answer different disaster scale that may occur in concerned areas. Special focus was to help the proposed project budget to feed as much as possible the local economy. This included the need for manpower, material production and supply.

General concept:

1. Learning from strengths and weaknesses of local building culture;
2. Assess evolution of local practice according to changing context (concept of sustainable development);
3. Develop adequate solutions, activities, strategies to help building local capacities at all necessary level;
4. Focus on existing houses designs and how:
   a. They can be improved if one want to build a new house
   b. They can be improved before a disaster/repaired after a disaster (for becoming safer and long-lasting)

  c. Design of disaster response shelter can help
    i. To disseminate good practice to achieve the points above/or
    ii. How material used for LCH can be fully reused by the owner for the permanent house construction after a crisis/or
    iii. How the LCH can be designed as to be a part of the permanent house construction by the owner after a crisis.

5. Take into consideration of local technical and financial capacities to replicate proposed design (as well as social and cultural acceptance).
6. Consideration for the maximum use of innovative component using local material to feed the local economy.

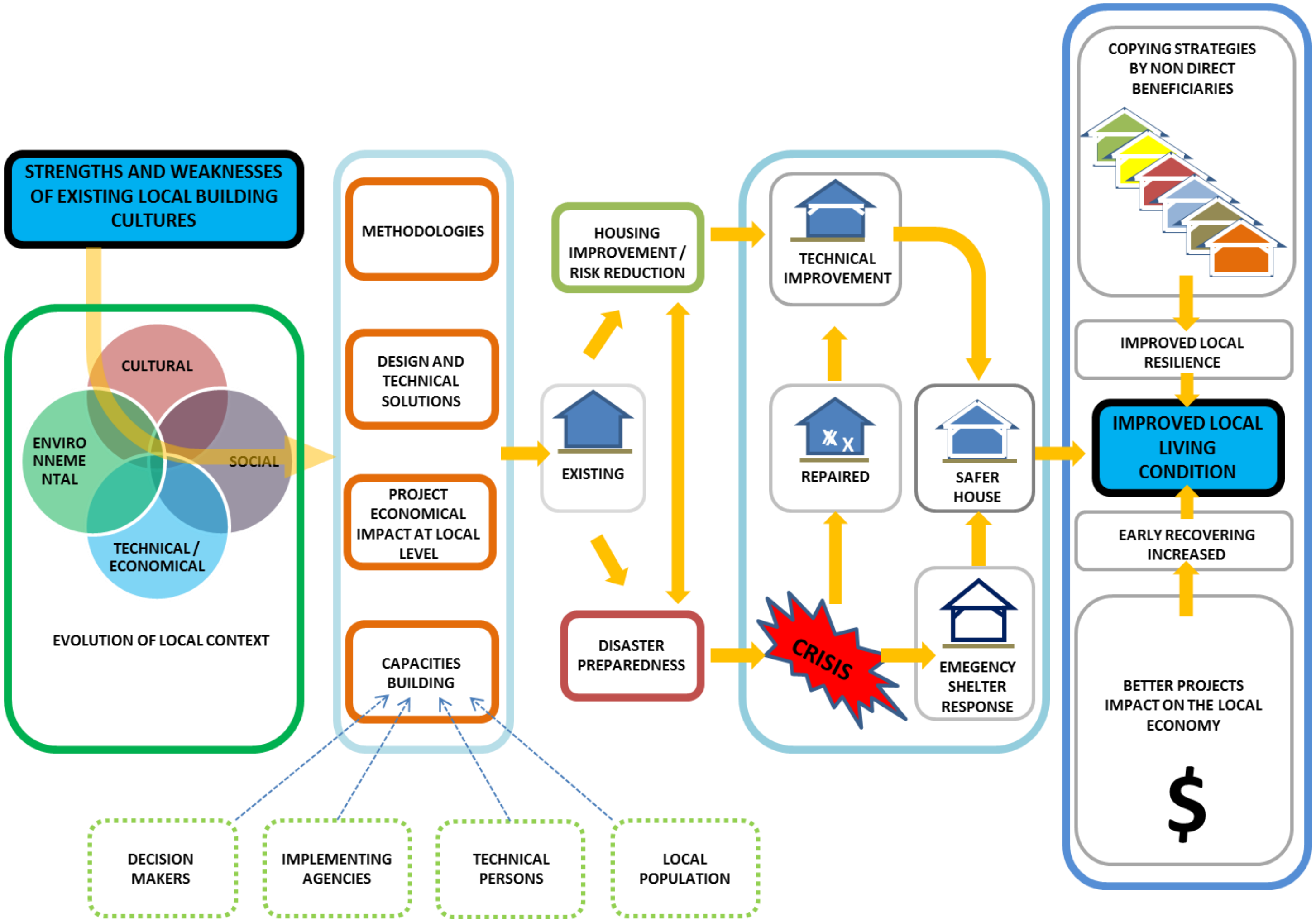

STRENGTHS AND WEAKNESSES OF EXISTING LOCAL BUILDING CULTURES
CULTURAL
ENVIRO NNEME NTAL
SOCIAL
TECHNICAL / ECONOMICAL
EVOLUTION OF LOCAL CONTEXT
METHODOLOGIES
DESIGN AND TECHNICAL SOLUTIONS
PROJECT ECONOMICAL IMPACT AT LOCAL LEVEL
CAPACITIES BUILDING
DECISION MAKERS
IMPLEMENTING AGENCIES
TECHNICAL PERSONS
LOCAL POPULATION
HOUSING IMPROVEMENT / RISK REDUCTION
EXISTING
DISASTER PREPAREDNESS
TECHNICAL IMPROVEMENT
REPAIRED
SAFER HOUSE
CRISIS
EMEGENCY SHELTER RESPONSE
COPYING STRATEGIES BY NON DIRECT BENEFICIARIES
IMPROVED LOCAL RESILIENCE
IMPROVED LOCAL LIVING CONDITION
EARLY RECOVERING INCREASED
BETTER PROJECTS IMPACT ON THE LOCAL ECONOMY
$

Fig. 1. Flow diagram showing the project activity

Project Description

During the pilot phase, in total 50 houses were built. Two contexts were studied, Kuakata and Sirajdikhan. Results showed that it is feasible to develop contextual solution that fits with international standard, meets people's needs and creates better impact, in both the local economy and existing local building practices.

Upon successful completion of the pilot phase, and taking into account lessons learnt, CB took up its consolidation phase (October 2011- March 2015) for six other regions of Bangladesh.

Choice of implementation areas was made according to a combination of various factors:
- Hazard affecting these areas,
- Local building practice (shape, building material, techniques, etc.)
- Inhabitant specificities (local culture)
- Past experience of CB in the area

Eight regions were selected for project implementation:
- Kuakata of Patuakhali district, cyclone prone area
- Sirajdikhan of Munshiganj district, flood prone area
- Chittagong region
  - Bandarban- a flash flood, cold wave, landslide and fire prone area
  - Chakaria and Anowara-cyclone and flash flood prone areas
- Khulna region, Assasuni, Shyamnagar and Rampal-cyclone prone areas
- Sylhet region,
  - Kanaighat– flood and earthquake prone area
- Tahirpur and Kulaura- flood prone areas
- Mymensing region
  - Dhubaura-a flash flood prone area
  - Kolmakanda and Durgapur-flood prone areas
- Dinajpur region
  - GaibandhaSadar-a riverbank erosion and flood prone area
  - Birganj and Chirirbandar-flood prone areas
- Rajshahi region
  - Porsha- earthquake, drought and cold wave prone area,
  - Tarash and Putia-flood and cold wave prone areas.

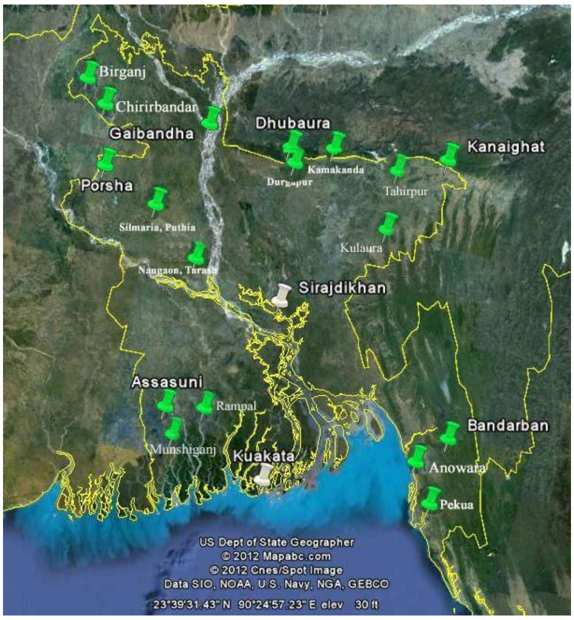
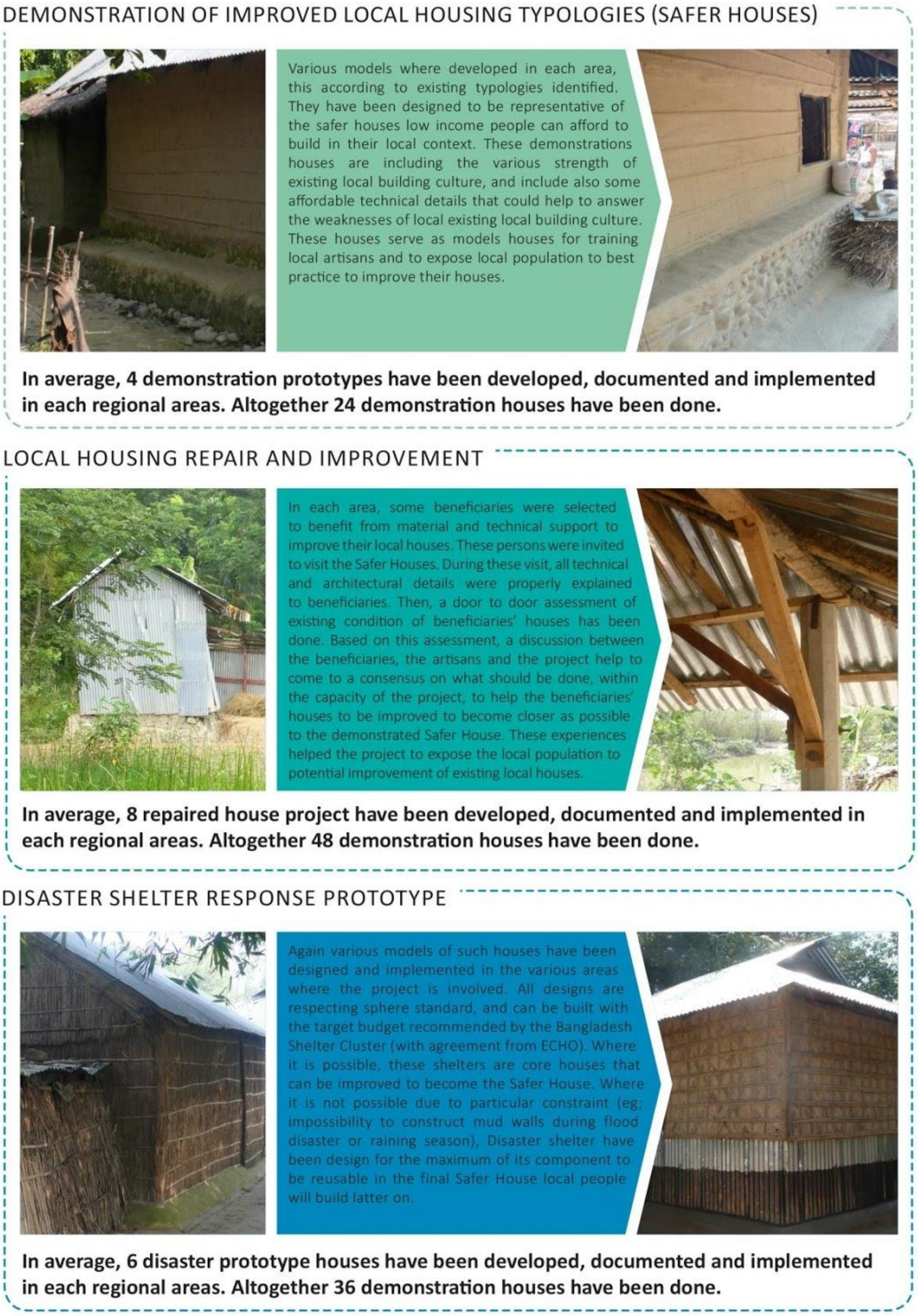


Fig. 2. Bangladesh map showing the project locations

Direct output:

Beside the construction of 50 demonstration houses in the initial pilot project, the following activities have been implemented:



DEMONSTRATION OF IMPROVED LOCAL HOUSING TYPOLOGIES (SAFER HOUSES)

Various models where developed in each area, this according to existing typologies identified. They have been designed to be representative of the safer houses low income people can afford to build in their local context. These demonstrations houses are including the various strength of existing local building culture, and include also some affordable technical details that could help to answer the weaknesses of local existing local building culture. These houses serve as models houses for training local artisans and to expose local population to best practice to improve their houses.

In average, 4 demonstration prototypes have been developed, documented and implemented in each regional areas. Altogether 24 demonstration houses have been done.

LOCAL HOUSING REPAIR AND IMPROVEMENT

In each area, some beneficiaries were selected to benefit from material and technical support to improve their local houses. These persons were invited to visit the Safer Houses. During these visit, all technical and architectural details were properly explained to beneficiaries. Then, a door to door assessment of existing condition of beneficiaries' houses has been done. Based on this assessment, a discussion between the beneficiaries, the artisans and the project help to come to a consensus on what should be done, within the capacity of the project, to help the beneficiaries' houses to be improved to become closer as possible to the demonstrated Safer House. These experiences helped the project to expose the local population to potential improvement of existing local houses.

In average, 8 repaired house project have been developed, documented and implemented in each regional areas. Altogether 48 demonstration houses have been done.

DISASTER SHELTER RESPONSE PROTOTYPE

Again various models of such houses have been designed and implemented in the various areas where the project is involved. All designs are respecting sphere standard, and can be built with the target budget recommended by the Bangladesh Shelter Cluster (with agreement from ECHO). Where it is possible, these shelters are core houses that can be improved to become the Safer House. Where it is not possible due to particular constraint (eg; impossibility to construct mud walls during flood disaster or raining season), Disaster shelter have been design for the maximum of its component to be reusable in the final Safer House local people will build latter on.

In average, 6 disaster prototype houses have been developed, documented and implemented in each regional areas. Altogether 36 demonstration houses have been done.

Fig - 3 Types of Housing Activities

All these demonstration opportunities were able to train local artisans (to build a team of qualified artisans who will be deployed in case of necessity).

These demonstrations were used to disseminate the proposed improvement amongst the targeted communities.

This process helped to develop then document an appropriate participatory approach, in term of housing design based on local good practices and local potential for improvements.

This project helped to develop and document adequate methodological approach for the implementation of such approaches.

During the project, effort was made to translate field lessons learnt into training material both for field and academic training implementation.

The project also includes awareness strategies (exhibitions, conferences, seminars, workshops) and lobbying activities to the donor community and Bangladesh Shelter Cluster.

What are the key features of the project?

Key Features:

Design–Method-Education/population –implementing agencies–educational institute

- **Adequate community led selection process.**

Process: Conducted meetings with community people, probable beneficiaries, project committee members and local government members. CB personnel facilitated the meetings. The participants shared their points with logic for selection criteria of beneficiaries. After prolonged discussions and debates the selection criteria were finalized. Then they proposed name of the probable beneficiaries according to the criteria and provided logic for proposing the name. From the discussions and debating, the participants came to a consensus and made a primary list on priority basis.

After that Caritas personnel and the project committee members jointly visited houses under the primary list. They compared the condition of houses and families with the selection criteria of beneficiaries. The primary beneficiaries list (after physical verification) and selection criteria displayed in a common and visible place for taking opinion/feedback from the community people on it. Feedback boxes were set in the same places. Complaints/feedbacks were received and verified. Necessary corrective measures were taken by the project committee and CB personnel. Later on CB and the committee informed the feedback providers of the action taken. Analyzing the feedback/complaints in the project committee meeting, the beneficiaries' list was finalized. The final list was also displayed in the common places for information of the community.

- **Adequate method to assess local building culture strength**

In designing houses, the level of hazard was estimated. Importance was given to use locally available materials and technology and show respect for local culture and practice. Affordability, safety and re-applicability of the community were taken into consideration. Even in the same area house design varies significantly. Methodological approaches as well as appropriate tools have been developed in order to be able to collect of necessary information.

- **Adequate method with the communities to co-design housing improvement and LCH based on existing good practices and windows for improvements**

An integrated approach including sanitation component was followed and hygienic latrines were installed with the houses.

Appropriate community led approach has been designed and improved all along the project in order to secure appropriate solution developed by the project. Designs have been checked and verified by the BUET team.

Adequate mass awareness strategy
Through sensitiziation, people were informed about the improved techniques using demonstration houses.

- **Increasing CB team capacities in implementing the global approaches**

In order to ensure CB staff capacity building regarding the whole project approach, activities have been implemented step by step, with first phase handled by international (CRAterre) and national (BUET, CB) expertise with a strong training component in direction to national and regional CB staff. Then an appropriation phase was handled by CB national and regional staff with a strong training component in direction to regional and local CB staff. Finally, a consolidation phase was implemented at level of CB local staff. All phases were monitored by CB national staff, with punctual support of National and International expertise. Exposure visit to all areas covered by the project were organized to all CB regional staff involved in the project.

- **Increasing artisans capacities during onsite training**

Trainings were conducted in all project operational areas. Numbers of trainees exceed the need of the construction itself. Artisans were selected based on the following

- Should be local
- Working in local houses
- Committed
- All known artisans for the targeted area (ward – 2 to 3 surrounding villages), were invited to be part of the training (in average 12 artisans have been trained during each training. In total 258 artisans trained)

- **Develop DRR program according to lessons learnt**

After these preliminary phases completed (appropriation of methodological approach regarding assessment and community-led houses design), CB local and regional staff develop plan of action in order to answer different disaster scale that may occur in the near future in their areas. This included the need for material production and supply, the available skills artisans trained during the project and how to make the best use of them to answer the different disaster scenario, the local management capacities to implement the necessary projects.

- **Field results to feed educational institute**

BUET teachers started to organize seminars and conferences regarding the project findings and learning. They also included such topic in their relevant lectures. Even such lectures are not yet compulsory, they could attract a lot of students of different levels (both undergraduate and postgraduate). It means that more and more future key actors in the Bangladesh housing sectors will be aware of the reality of the rural housing situation, with basic approaches on how to handle the huge challenge to improve housing resilience for the poor.

- **Using project result to sensitize implementing agencies and donor’s community**

All opportunities were taken to expose the project approach and results to as many individuals and organizations as possible. Two exhibitions took place in Bangladesh. One took place in France.

CB exposes the project approach and learning to key actors in Bangladesh on various seminar and workshop (eg Shelter Research Unit Workshop in Gaibandhain 2014, regular national shelter cluster meeting in Bangladesh).

- **Using project result to sensitize the international community**

Technical papers have been developed based on the project learning which have been published in local and international conferences.

Who are the main beneficiaries of the project?

Vulnerable poor families living in disaster prone areas in Bangladesh are the beneficiaries of the project. According to 30 million people in Bangladesh are living in such conditions.

Describe briefly the cost of the project and/or planned future funding of the project?

Total cost of the project is **272 767Euro.**

Breakdown is as follows:

Capacity building	**83 924Euro**
Demonstration building	**69 297 Euro**
National expertise	**30 485 Euro**
International expertise	**69 360 Euro**
Monitoring &Evaluation	**6 959 Euro**
Admin cost	**12 742 Euro**

What has been the involvement of the local community in the project?

Approaches adopted for demonstration house, repaired houses and disaster prototype involves community participation.

Preparatory phase
Feedback from community for developing survey format

Preliminary phase in each area where the project has been involved
When local organizations already exist, project works with them in order to form a local Project Committee (PC).
Where it is not the case, the local PC is formed after many meetings aiming all partners to come to a common understanding the project, most of the time, community leaders and artisans joins in the project committee.
Beneficiaries' selection is made following community-led approach (selection criteria/beneficiaries' identification/beneficiaries list monitoring and evaluation/final choice).

Survey implementation, assessment of local housing conditions as well as identification of strengths and weaknesses of local building practice, design of demonstration houses
Each steps of this whole process is done with PC members as well as others community persons. Conclusions of each step were presented to the community (mass meeting) and validated during these events before starting the next step.

Construction
Procurement of required material is done by PC. Construction is done by local artisans (trained on site), selected by the PC and some cases beneficiaries also participated. After completion of model house, feedback from community is required in order to finalize houses design for further implementation.

What future plans (if any) are there for the project?

Caritas Bangladesh level:

Caritas staff members will carry on incorporating their knowledge and skills in disaster preparedness and emergency response activities.

CB will carry on propagating the acquired knowledge to national and international NGOs, government sectors and Caritas International partners. To achieve this, they will take opportunities of being part of Bangladesh National Shelter Cluster for disaster response to share the approach at the national level. They will take an opportunity to be part of the Asian Caritas Network to share with other Caritas Offices in Asian Countries about the project.

To improve on the existing results, there is a need for a proper documentation at different level

- Sensitization material for mass awareness
- Technical catalog of solution, (artisan and implementing agencies)
- Methodological approach (implementing agencies)
- Advocacy material (donor's, decision makers, implementing agencies)

Then, there is a need to consolidate existing knowledge within CB technical and management staff.

After that changing project scale will be required and it is planned to organize mass awareness activities as well as nomadic training for enhancing capacities of local artisans, involving local training center as to help this topic to become compulsory in their curriculam.

These activities will be implemented in disaster prone areas where Community Managed Disaster Risk Reduction (CMDRR) Projects are run by CB.

BUET Level

Educational institutes like BUET and practicing engineers can incorporate the learning from the project into the building code, text book, etc. Expansion of research regarding LCH and related topics will have to be included in the curriculum of the technical institutes and universities without delay. BUET faculties and students are conducting research for the improvement of LCH. Such research findings will be useful for the disaster resilient house construction in Bangladesh. Development/learning of the project will be useful for inclusion in the curriculum of the Department of Civil Engineering, Architecture, Urban and Regional Planning, BUET-JDPUS, etc. Local and international collaborations are needed for better development. BUET is exploring the avenues to collaborate with other educational institute to promote the developed approach in designing disaster resilient LCH.

CRAterre level

Through education, UNESCO Chair on earthen architecture and sustainable development – Post master degree on earthen architecture and sustainable development - dedicated training with the IFRC- lectures within the National School of Architecture of Grenoble) research (Atlas of existing local building practice in disaster prone area; Strategies for Risk reduction and reconstruction),seminar and publication, networking (Caritas Internationalis, IFRC, etc.), CRAterre will disseminate the results of this project worldwide.

Innovation and replication

What are the key innovative aspects of the project?

1. Put the local population at the center of the whole project implementation: adopt a participatory approach, support the bearers of local knowledge and know-how, strengthen social ties, thus enable a return of individual dignity,
2. Learning from the existing local building culture and valuing existing communities' best practices regarding construction and local resilience,

3. Implement the project through an iterative approach, from pilot projects, consolidation phase then, dissemination, including regular monitoring and evaluation. This helped to adjust methodological approach, strategies and architectural design at all steps of the project.
4. The approaches are new for shelter response context of Bangladesh but these are appropriate for capacity building of the staff of organization, local artisans and community people. As a result, proper implementation of the shelter project after any disaster is possible within appropriate time limit.
5. Pay attention to economic accessibility issues, so that duplication is possible for a great number; “Think on how the beneficiaries’ neighbors will benefit from the project, not only on how the beneficiary will benefit from the project”,
6. Attention has been made so that accountability to beneficiaries can be achieved. Improvement has also been scientifically demonstrated.
7. Effort has been given to scientifically prove the behavior of local building concept (material capacities, technical details, general concept)
8. Linking tradition and modernity, the project pays a deep attention to help local population to understand the value of their local culture, and to prioritize their housing improvement (using local and industrial materials) according to the potential of the local environment as well as their own technical and financial capacities.
9. To link early recovery and poverty alleviation in order to avoid money invested in housing project to “by pass” local communities or has a very limited impact on them.
10. To link emergency, rehabilitation, risk reduction, disaster preparedness and development, when designing of houses (core shelter, or easy to reuse material from shelter response, demonstration of relevant technical improvements, etc.)
11. To link actions, researches and educations

To what extend has the project been replicated locally, nationally, or internationally? (If applicable)

CB:

- Replication of structural members and techniques of the houses built under the project has been started
- The approach of the project incorporated in the new strategic plan of Caritas Bangladesh (http://www.caritasbd.org/controller.php?res=view/vi_publication/-page 11, 23 and 24)

- Decisions were taken in the yearly national workshops of Caritas Disaster Management Department to use learning of the project to any shelter response under CB

- The approach, techniques and innovations of the project used for the following CB shelter response:

    - Shelter response for Nor'easter 2013 affected families (picture)

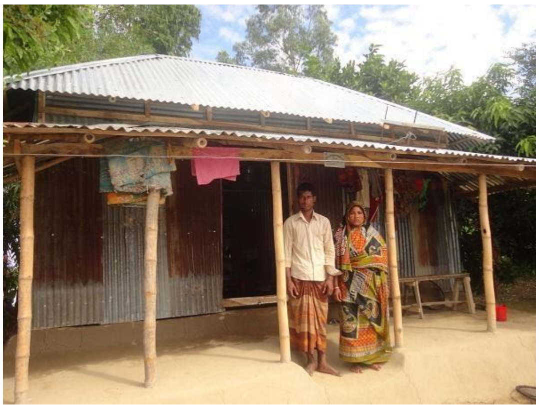


Fig 4 Shelter for Nor'easter affected families

    - Shelter response for Flood 2014 affected families

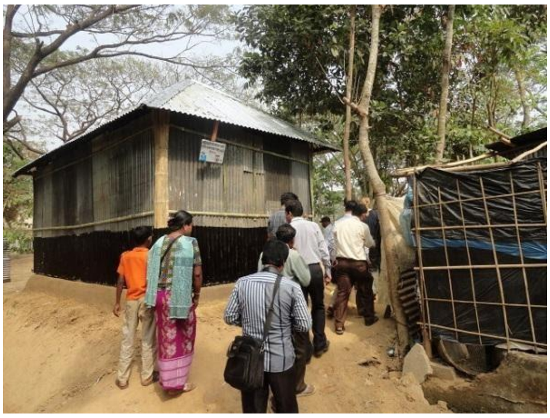
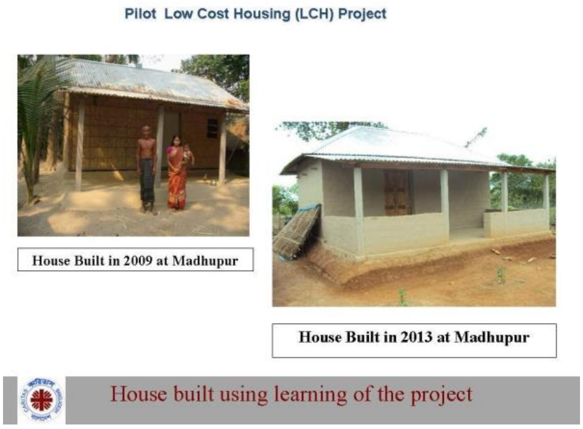


Fig 5 Shelter for Flood 2014

- Shelter for the Poorest Women and Children Project, 2010-2012



Pilot Low Cost Housing (LCH) Project

House Built in 2009 at Madhupur

House Built in 2013 at Madhupur

House built using learning of the project

Fig 6 - Mud wall house built in 2014 for Shelter for Poorest Women and Children project as per local practice after learning from the project. In the same area for the same project, the house was built with bamboo fence in 2009.

- Shelter for Tea Garden Workers of CB (2010-2011)

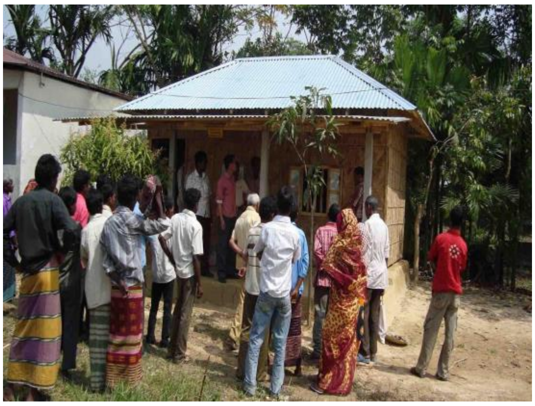


Fig 7 - Orientation to the beneficiaries after making a sample house for Tea Garden

- CB shared the project results at different levels:
- CB Shared approaches and learning of the project through Regional Review Workshop with the different projects of CB and other NGOs who work for shelter. Other NGO invites to share the project approaches and learning to their staff and partners. Other NGO personnel visits the houses built under this project.
- A CB personnel is a member of shelter cluster and also member of Technical working group for shelter
- CB shared the project results with ECHO and all members of Bangladesh Shelter Cluster. They succeed in helping Bangladesh Shelter Cluster to adopt some of the good practices learnt during the project. And also replicated some innovations to the shelter responses funded by ECHO.
- CB up date the learning/innovation in the Bangladesh Shelter cluster meetings
- CB shared the project approaches and different designs of different locations/contexts in the National Shelter Workshop organized by Shelter Research Unit (SRU) in November 2014
- CB shared the project in the three seminars and three exhibitions organized by France Embassy where practitioners and professionals participated. They were sensitized and opined to use this approaches
- Community led beneficiary selection process of this project is using other projects of CB

BUET:

- Developed knowledge has been delivered in the course Detail of Construction (CE200) and Appreciation course (CE210).
- Researches have been conducted at both undergraduate and postgraduate levels.
- BUET-JIDPUS is developing curriculum for postgraduate diploma and masters level courses incorporating LCH project knowledge.

CRAterre:

The project was the subject of various presentations during international conferences

- "From local building practices to vulnerability reduction: building resilience through existing resources, knowledge and know-how ". In : Procedia Economics and Finance: 4th International Conference on Building Resilience, Building Resilience 2014, 8-10 September 2014, Salford Quays, United Kingdom. Vol. 18, p. 932-939.
- Tech4 Dev, 2014
- "Improvement of vernacular housing for disaster prone areas in Bangladesh: A six year experience" *Vernacular Heritage and Earthen Architecture: Contributions for Sustainable Development – Correia, Carlos & Rocha (Eds) © 2014 Taylor & Francis Group, London, ISBN 978-1-138-00083-4*

Project lessons learnt and good practice have been capitalized and are used as support to disseminate the approaches to a large variety of publics:

- Student in 4th and 5th years at the school of architecture of Grenoble, France. Lectures on LRRD and on the benefit to take into account Local Building Culture in housing related project (40 students / year).
- Student of master degree on "earthen architecture, local building culture and sustainable development", CRAterre – Grenoble – France (25 students / year).
- Field practitioner; Somalia Shelter Cluster Training April 18-30, 2015; (UNHCR, Danish Refugee Council, CHF). (30 participants, 15 international NGO)
- Lectures based on the project learning have been included in the IFRC RDRT training.

Project results helps to convince partners such as FIRC, SC/CF, LAbex, to consolidate the learning in a guide: "A field guide for the assessment of local habitat and risk practices" that has been peer reviewed by 70 persons, representing more than 30 international organizations, and that will be published by end 2005.

Finally, similar approaches have been used to develop post disaster housing responses in Haïti (SC/CF _ MISEREOR _ UN Habitat _ EDM _ PlanèteUrgence ; 2010 – 2005 / IFRC 2013 - 2014), Benin (Benin Red Cross ; 2013-2014), Nigeria (Nigeria Red Cross ; 2013-2015), The Philippines (SC-CF & Caritas Belgique; 2014-2015).

Annexe 2 Site analysis by CB in different region of Bangladesh

Caritas Bangladesh
Region: Rajshahi
Monitoring Format for Pilot LCH Project

1. Location: Village: Naogaon, Union: Naogaon, Upazila: Tarash, District: Sirajganj.
2. Model house type: Disaster Prototype- 2
3. Date of visit: 27/11/2014, Time:11:00-1:30
4. Date of drawing and design finalization: July 2014
5. Starting date of materials procurement: July 2014
6. Completion date of materials procurement: July 2014
7. Date of treatment of materials: July 2014
8. Types/method of treatment: watering.
9. Starting date of house construction: July 2014
10. Completion date of house construction: September 2014
11. Detail of house construction:

    a. Number of mason: 3 Local Working days: 6
    b. Number of carpenter: 5 Local Working days: 25
    c. Number of Fence maker 4 Local Working days: 8
    d. Others: 6 Local Working days: 18
    e. If non local causes: Not applicable

12. Status/progress of house: Completed

    a. If not completed when will be completed: Not applicable
    b. If completed how many days required: Not applicable

13. Time required for house making: 30days

    a. Making of post: 14days Setting of post: 4 days
    b. Making of truss: 4 days Fixing of CGI sheet: 2days
    c. Making of door and window: 10 days Setting of door and window. 1days
    d. Making of fence: 3days Fixing of fence (Tati): 2 days
    e. Making of *Ceiling*: 2days Covering of *Ceiling*: 2days
    f. Making of plinth: 3 days Finishing of plinth: 2days

14. Organization of house: South//east

    Causes: Available ventilation and light.

15. Variation compare to design: no

    If yes, Variations: Not applicable.

Causes:

16. Quality of work: Combined CGI sheet & Bamboo fencing is good.

    a. Measurement: OK
    b. If changed, Causes: Not applicable
    c. Alignment: good
    d. Materials: good
    e. Workmanship: good
    f. Joinery: moderate/

17. Use of materials:

    a. Local materials: Size wood, Bamboo, Bran chase of bamboo, Nails, Wire, Cement, Sand,
    b. Non local materials: No

    If non local,
    c. From where procured: N/A

18. New/innovations:

    a. From local practice: CGI sheeted fencing,, 4pitches roof, tie beam,
    b. From Engineering team: Combined CGI sheet & Bamboo chatai fencing, Katla, wooden wall plate, parallel window & door, ceiling, 2Rooms.
    c. Probable Replicable innovations: Verandah will be need.

19. Community's satisfaction level: good

    a. Participation of community: good
    b. Process of implementation: good
    c. Quality of work: good
    d. Transparency: good
    e. Accountability: good

20. Cost of house (up to date): model 1 = 85,197 taka, CGI sheet and Tati fence.

21. Area of improvement for next model house:
    a. Verandah will be include.

22. Overall comments:
    a. Model house is strong and risk redacted but it is very costly for the poor families.
    .

Prepared by
Augustine D'Cruze
PO (DMD)
Cartas Rajshahi Region

Caritas Rajshahi Region
Pilot Low Cost House (LCH)
Survey Report for new area (CMDRR area)

Date: 29 January 2014
Village: Naogoan
Ward: 4
Union: Naogoan
Upazila: Tarash
District: Sirajgong
Total houses in this village 140.

Main findings

- Law land
- The village is situated inside of the Chalon beel (a big water body near by Jamuna river)
- Distance from upazila head quarter 12 km
- Communication by pucca road and water body(rainy season)

Main risks

- Normal flood with rain water
- Every year during the rainy season water level 3'-0'' to 8'-0'' from paddy field.
- Last flood in 2013 water level up to 10ft
- Every year during mid-April to November the Chalon beel is full in the water.

Main problems

- Transport & Communication hindrance.
- Community people can not move from one place to another with out boat.

Wind storms

- Every year in the month of April to May
- Earthquakes rare.

House typology

- Houses are scatted but some area houses are grouped.
- Houses are rectangular size but 80% houses not verandah only 20% houses have verandah.
- The entrance on the long side.
- Most of the houses has single room, some times an internal partition done by fence.
- 90% houses have not ceiling.
- The kitchen is generally separate in front or other side.
- Extension of the house is constructed left or right side.

House structure

- **Foundation/Plinth**
- Mud plinth 1' to 2.5' height
- The plinth has not slope. It is constructed vertical height.
- Some houses have brick flat soling on the side of the plinth.

- **Main structure**

- **RCC pillar, bamboo/timber post**

- Most of the houses RCC pillars are directly put in the ground1’ to 2’ (4 corners and mid of the long side)

- Most of the houses bamboo/timber posts are set on the RCC base (katla) connected with MS flat bar and nut-bolt.

- The bottom part of the bamboo/timber post is damaged due to water and insects.

- RCC pillar are lasting (20 to25 years) then bamboo post.

- Some houses have used corner bracing in the main structure.

- Wooden/bamboo wall plate are used 4side connected 4corners. Some houses used long bamboo bracing corner to corner (one side bottom of the post and another side top of the post)

- Most of the hoses have bamboo tie beam.

Fences

- CGI sheet fences
- Nailed to the post on the inner fences frame.
- Tie the fence with wire in the RCC pillar of 4corners.
- Damage the lower part due to rain and moisture.
- Single line Brick Flat Soling used between the fence and plinth.
- Some houses used alkatara lower part of CGI sheet and bamboo/timber post
- Bata/chon fences are used maximum kitchen.
- During the flood/rain all type fences are damaged excepted CGI sheet fence.

- **Roof structure**

- Most of the houses used 4 pitched roof covered with CGI sheet.

- Bamboo or timber rafter and wooden purline are used. Some houses used bamboo and timber (combined) rafter are used.

- Most of the houses have maximum 1’ to 1.25’ cornice.

- Some houses have single slop verandah (front side) separate structure.

Joints

- RCC pillar half casting (projection) of the top part to fix wall plate with nut-bolt.

- Iron wire are used to tie.

- A half bamboo sized and nails to connect bamboo post with timber wall plate.

- Nails and iron washer generally used to fix CGI sheet (roof and fence)

- **Ceiling**

- 90% houses have not ceiling.

- Some houses used partly jute stick ceiling.

- **Openings**

- A door and 3 or 4 small window any 2 corner sides.

- Gap of the fences top is generally meet up the ventilation and lighting.

Materials

RCC Pillar & katla (rectangular size)

- Produced by the local artisan in the local market. The people buy them as per need.

- **Bamboo**
- Different types and size (6" to 10" perimeter) bamboos are used.
- 3years matured bamboos are used.
- Before used the bamboos are put in the water some days and dried them in the sun some days.
- Generally available in the area and the people buy it local market.

Wood

- Uklipters, Mahgoni. Palm and piple wood are generally used. Size wood treatment same bamboo.
- Some people used crude oil and alkatara to protect from insect.

CGI sheet

- Alkatara is used on the lower part (out side) of CGI sheet fences for protection rain and moisture.
- After 5-6 years the CGI remove horizontally to repair and apart of new CGI sheet set top of tee fences.

Mud for plinth

- Collect from the low land in dry season.

Transport

- Materials are carried by van, fuel engine and trolley.
- Most of the materials are locally purchase. But bamboo chatati (kholpa) is purchase from Sirajgong (district bazaar).

Skills

- Plinth is actually done by the owners and some relatives.
- The main structure and the roof are built by local artisan.
- All mason, carpenters and artisan have no professional training and there is no any training institute nearby. They learn to working with senior artisan.

Maintenance

- Mud plinth and floor plaster years done by owners and labors (Women).
- Bamboo post every 2 years without katla.
- Bamboo post every 6-7 years with katla
- Chon fences have changed every year
- All repair work has done before rainy season.

Construction

- All type of houses construction in dry season (November to April)
- Time required for a house construction 8 to 10 days.
- Time required for the plinth height 40 to 60 days (if owner done)

Suggestion for design strategy

Size

- Size 24’-9’’x15’-6’’ (according to CGI sheet dimension) 2room without verandah.

Plinth

- Mud plinth 1’-6’’ height.
- 5’’ brick wall up to plinth level on the exposed side to rain cut.

Main structure

- RCC pillar at four corners and middle of long side with bamboo post with katla (for changed damaged bamboo post as per need) and corner bracing.

Fences 3parts

- CGI sheets in the bottom part (up to flood level) with wooden frame.
- Thick bamboo fences in the middle part.
- Thinner bamboo fences in the upper part.

Roof structure

- 4 pitches CGI sheets roof
- Wooden runner.
- Wood and bamboo combined truss.
- Wooden purline

Joints

- Upper end of RCC pillar and bamboo posts will be L shape for runner joint.
- Nails and nut-bolt

Ceiling

- Bamboo woven mats

Opening

- 2 doors
- 4 windows for ventilation and lighting.

Others

- Turf with grass or small size plantation outside of the plinth to rain cut and plinth slide.

Prepared by	Checked by
S M Golam Rosul Field officer (DMD) Caritas Rajshahi Region.	Augustine D’ Cruze Program Officer (DMD) Caritas Rajshahi Region.

Hiradanga village

(Porsha Upazila, Rajshahi Region)

1. GENERAL INFORMATION

Village/Para: Hiradanga, Uchadanga, Bashpara (UCHA = risen land; Hiradanga= place of diamonds; Bashpara= bamboo village)

Ward no. 3
Union: Chaor
Upazila: Porsha
District: Naogaon

Population:

509 persons divided in 129 families (Hiradanga: 37, Uchadanga: 51, Bashpara: 41)

- Bengali and *Adivasi* (Indigenous) communities (Sawtal, Urao, Mali, Pahan)
- Christian, Muslim and Hindu peoples live in different settlements
- Most of the people are migrated from other villages
- 18 adivasi families are living on government land; a Union Parishad member took initiative to settle them there, divining the available governmental land according to number or families. If wanted they can submit a request for getting official ownership for the land where they are staying.
- Sometimes people live in enlarged families
- They live there since more than 300 years

Family sizes:

Big	7-8 persons
Medium	5 persons
Small	3 persons

Main activities:

Most of the people don't have land to cultivate and work as daily labours in agriculture land. The cost of labour is 150 taka for male and 100 taka for woman.
People generally have some animals: cows, ducks, chickens, goats.
Bengali are mainly farmers, but only 2 of them have land.
People are no self-sufficient and they are job less 3-4 months/year: they have to borrow money from the landowner as advance for future labour and they get rice from the landowner during crisis.

Infrastructures:
One tube-well, one pond and one rain water harvesting plant (capacity 32,000 litres) but can't fulfil the local people needs.
No market exists.

Education:
2 schools: pre-primary BRAC school and governmental primary school

2- SITE

Uneven (Barind) land and rural area.
Settlements have poor vegetation protection and are directly exposed to wind.

Village is situated at about 15min by car from Porsha, on a kutcha road.

Main Risks:

- Drought: rain only 3 months/year (May-July)
- High temperature variation: from 7°C to 45°C
- Cold wave: yearly
- Earthquake: moderate: twice per year / quite strong: every 3-5 years
  18th September 2011 Nepal-Sikkim earthquake (M 6.9) stronger than previous one; no heavy damages, only some cracks to the houses
- Storm: strong winds and rain in April-May, yearly frequency
- Floods: rare (last flood in 1998)

3- HOUSING TYPOLOGIES

House orientation and position are south or east facing to get air and light.

Houses are generally 2 storey height and based on a rectangular plan.
1 to 2 rooms at the ground floor and 2 rooms at the first floor.
Stairs are generally in the middle between the two rooms, to have direct access to the rooms; the access can be done from outside (if 2 families in the same house) or inside (if just one family). In bigger houses the stairs are generally on one side connecting veranda and balcony.
The first floor is generally used as storage place or for guests, but when more families are living in the same house, they stay one family per floor.
An open or closed veranda is generally provided.
Due to land problem, house extensions are done in vertical direction, to keep some place in front of the house and to reduce cost. In some cases, people build the veranda after some time having accomplished the main part of the house.

Animals are kept inside the house due to robbery problems. If 1 room house, people sleep on the veranda, if more room they sleep inside but often one person sleep in front of the door.

4- HOUSING STRUCTURE

- Plinth/foundations
  Mud plinth done compacting dry soil to avoid rats.
  In low land plinth takes 5 years to dry up.
  During rainy season, erosion of the plinth.
  The plinth is made after finishing the wall, infilling the space between the walls.
  Plinth height: 10-50 cm

- Main structure
  2 types of structures:
  - load bearing mud wall: widely used
  - bamboo frame: used by the poorest people

  Load bearing mud wall: Technique: cob

Wall thickness: 3’ (90cm) at the base, 18’’ (40cm) at the top of a 2 storey wall
Layers: about 25-50cm
Wall height for a 2 storey house: 18’ (540cm)
Straws (rice or vetiver) is usually used to prevent big cracks
Inner side of the wall straight
Outer side of the wall: thickness is reduced with 3 steps of about 1.5’’ (about 3cm) every 5’-6’ (150-180cm) to reduce wall weight. The thickness reduction is not done with a slope because it’s more difficult to control it during construction.

Cracks in the wall due to water erosion during rainy season.
Splitting of the corner due to lack of wall plate.
Rats and snakes come inside through the wall
This type of house can last also 100 years if well protected from rain

Mud wall thickness:

- useful to protect from heat and cold and from thieves
- it allows for future vertical extensions
- for better earthquake resistance

The first floor structure is with bamboo or wooden beams directly fixed in the wall, half bamboo culms or opened bamboo, mud finishing (3cm)
Beams distance: about 50cm
Cracks in the mud wall under beams due to lack of wall plate.
Wood is generally preferred because more resistant, but with both bamboo and wooden structure the floor can bear 4 tons.
It can last more than 10 years.
Sometimes a diagonal bracing is used.

Bamboo frame:
Bamboo frame with bamboo fences (made of bamboo branches fixed with bamboo splits) and mud plaster
The wall last 5-6 years, after that inside panels are rotten and the wall collapse.

- Roof structure

Generally 4 slopes cantilever roof is used.
If owner is waiting for extension, just a 1 pitch roof is done.

Bamboo and wooden structure is usually used.
Before, for roof and beams palm wood was used but now shortage due to cutting and also high price.
In 2 storeys houses a projection roof (sunshade) is done at the height of the floor slabs to protect the wall from rain water.

Eaves > 5’

Roof covering: CGI sheet, rice straws, vetiver

Vetiver: cheaper than CG sheet and better thermal insulation

No water liking

- Fences

For bamboo frame structure, fences made using bamboo branches and leaves fences.

In this type of construction all the bamboo parts are used (culms for posts and branches and leaves for fences)

- Opening

Few and small windows in the upper part of the wall and with bars to prevent security problems
Lintel with bamboo, if it is rotten doesn't affect the stability of upper wall
Lintel: 6', inside wall 1'
Generally 1 door for room

- Ceiling

Generally no ceiling is used, but in 1 storey house, the space under the roof is used as storage place

- Finishing

Mud plaster on load bearing mud wall:
- different layers wit sandy mud, different from the one used for the wall construction:
  - Wall 1 thick layer mud + (rice, jute or vetiver) straws. To make the wall straight, they use wooden plank (patta);
  - 1 layer mud + rice dust (thin layer)
  - finishing layer: mud wall with a lot of water (liquid mixture)
- colours of the finishing layers : black with ash, red by smashing of soft gravels, light colour with sandy soil
- if not enough time or money: plaster is done only on the inside walls and on the floor
- Sometimes for water protection, bitumen is applied on the bottom part of the wall (about 90 cm).

- Other

Stairs:
Height of the marches: 25-30cm
- from ground floor to first floor, they are completely in mud and the space under the stairs is filled with mud
- In bigger houses, where there is a second floor under the roof used as storage space, stairs have bamboo structure covered with mud

Veranda:
Sometimes the roof is very low to protect more from rain and to allow a quicker flow of rain water so that roof covering material can last more.
Sometimes the veranda is closed with mud walls and become a third room

5- MATERIALS (species, treatment, processing)

Mud
- they take from home side or from fields without any cost.
- mud mix: straw + mud+ rice dust
- preparation: mud is mixed with water and kept for 2 days; than straw (cut at about 3'') and rice dust are added and mixed using feet and buffalos or cows.
  - Rice dust can cause insect problem
  - To use vetiver straw is better because more resistant and no insect problems.

Bamboo
- dia 3'' (8 cm), wall thickness ½ - ¾ inch (1.5cm)
- bamboo mature is used (2-3 years), people know the right moment by the changing of the colour (from green to yellow)

- cut by themselves at other people plantation in march
- seasoning done by a carpenter: branches and leaves are cut and the culms are dried up in horizontal position for 8-15 days to make it stronger and more resistant to insect
- Treatment: After seasoning bamboo is put in water for 10-20 days and then dried for 2-3 days; Treatment id done mainly for important parts (beams but not lintels)

Timber

Species:

- palm tree for roof: the most resistant for roof but there is shortage
- neem but it is most expensive
- Mango trees for door and windows

Timber treatment: dry up in the sun

Bamboo/wood protection:

- alkatra (tar) and crude oil are used against insects > on the whole bamboo and wood piece > they make dry and then they use; but some people do not do also if the price is not so different
- diesel oil is less expensive then tar because tar is mixed with kerosene so the cost is higher but it gives black colour and looks nicer
- now they mostly use diesel car cheaper

Vetiver (binna grass):

- Used for 4 slopes roof covering
- Can last 3-5 years
- There is shortage because its cultivation has been substitute with paddy
- Available in October

Provenance of materials

Bamboo:	from the village plantation
CGI sheet:	subdistrict market (Porsa bazar) 7-8 km
Mud:	village
Wood:	Murshidpur, local market (2-2.5 km)

They transport them by feet, bicycle, cow cart, cycle rickshaw or votvoti (3 wheels engine car)

- Cost: roof > wall > door and windows and mezzanine.

Water sources for construction purpose:
Tube well 128’-130’ depth
Gift from other persons
They buy > for a 1 storey building about 2000 BDT

There is a brick production site at 14km

Choice of construction materials:
The mud is the best material: comfortable for climate, lasting long time and resistant to strong wind

6- SKILLS

Different types of carpenters:
- mud wall
- Roof
- Door and window

Artisans organisation and duties: (salary includes breakfast, lunch and take away dinner)
Head mason: check the wall line and cut the mud wall > 200 BDT/day
Artisans 1: put the mud on the wall > 150 BDT/day
Artisans 2: bring the mud to the head mason > 150 BDT/day

This organisation corresponds to the apprenticeship stages. To become head mason 5-7 years are needed depending on artisan skill. There are no training centres nearby the village, they learn working with a skilled artisan.

Groups of artisans:
7-8 persons for mud wall construction
4-5 persons for roof
1-2 persons for door and windows

Generally, artisans don’t monitor their construction; they monitor only during roof construction.
There is no discussion among artisans concerning construction problems.

Artisans work on mainly on contract basis, sometimes also on daily basis, but it’s more difficult to ensure the presence of the artisan.

In the village there are no carpenter available, but in Thana (sub-district) do, at about 3km from the village.

The head artisan takes contracts for houses construction but then the semiskilled labour do the main part of the work, main artisans only take contract and give suggestions
semiskilled earn 70 BDT / hat of wall built (same rate for 1 or 2 storey)

Artisans for mud wall and roof don’t work the whole year but artisans for door and windows do.

7- COST & RATES

average salary: 150 BDT/day (8h-17h); 100 (10h-17h); 80 (11h-17h)

1house 2 storey 10’x18’ 2 rooms:
1 lakh BDT including labour (about 30000 BDT only for labour for mud walls) 80,000/- – 90,000/- (without GI Sheet) 1,00,000/- – 1,50,000/- (with GI Sheet)
12 hand × 6 hand house, 2 room, with GI Sheet roof and without truss- 1,00,000/- – 1,50,000/-

For roof:
Bamboo (15-16 Nos.) – 2,000/- –2,500/-
Wood: They cut wood at the saw mill 2 BDT/hand
CGI Sheet (10 bundles) – 3,000/- per bundle
Vetiver 1000 bundle = 1000 taka; 5000 bundles are needed for a medium size house roof + 3000-4000 labour cost

Total cost for a 30’x20’ house: 80,000 BDT (CGI sheet cost: 30000)

8- MAINTENANCE

People do not do regular maintenance because they have to work for earning money and they do not have time for maintenance works.

Mud plaster:

- inside: every 3-6 months
- inside finishing: every month only with water and mud
- floor: every 3-4 days
- done mainly by women but a artisans group for plaster maintenance also exist

Bamboo frame structure, bamboo fences and mud plaster:

- if not in contact with water, it last 20 years
- if in contact with water, after 1 year is damaged
- if bamboo fences + mud plaster as internal partition can last 10 years

Vetiver:

- every 5 years, damaged purlins and vetiver bundles are changed and the ones still in good conditions are mixed with the news ones

9- CONSTRUCTION PROCESS

Construction season: October to march
It takes 4-5 months for the construction of the house with 8 labours.
Generally for mud wall construction 2 months of work are needed + 2 weeks for roof construction (the roof construction starts when mud wall is finished) + 10-15 days for door and windows.

Often, the family contract an artisan and do only monitoring because they have to work.
If the owner doesn’t have enough money, he calls a carpenter only for the roof, but if people do the wall by themselves it won’t be straight and vertical.
House is built by passing a verbal contract among owner and artisan.
For design choice, mainly the men decide.

Wall construction:

- A trench of 6-9’’ is dug
- The existing soil is compacted (a special tool to compress is use or a wood piece)
- The existing soil is levelled with water to facilitate bonding
- the wall is built by 18’’-21’’ layers
- after 4-5 days the wall is cut with a special tool
- every 2 weeks a new layer is done
- the wall can be adjusted and extended also after several years
- 7-8 labours required to complete one layer with in a day.

Ways to reduce cost:

- use thatched roof that is cheaper but it lasts 2 years > they don’t know how improve the lasting > polyethylene doesn’t work because after 6 months is damaged
- to reduce cost of CGI sheet roof, they make its slope less vertical so less number of CGI sheets is needed
- reducing the thickness of the bottom part to 28’’ and the upper part to 18’’ (after the stability of the wall will be compromised), but people won’t accept because they feel that not enough strong
- family involvement in the construction:
- mud mixture preparation and transport from the preparation site to the building site
- Mainly men help in the construction works: men help to give water at the mixture and women providing soil.
- For the roof only the men help.

10- COMPLEMENTARY INFORMATIONS

Nearby CB did some houses in 2009: RCC pillars as structure to reduce the thickness of the wall, mud wall, metal trusses and CGI sheet roofing

11- PILOTE HOUSES

Site:

- The position of the house should take in consideration wind and rainfall direction and position of other houses, as well as cultural beliefs
- A site map could be done with the beneficiaries to fix site organisation and position of house and latrine

Cost:

Cost of existing house of poorer families, cost of lower middle class families

Cost can consider from the cost survey of the Regional offices and surveyed by Caritas and BUET Engineers. These are to be considered as basic cost. For improving some innovations/techniques cost of houses may be different but range will be limited.

2 types:

- M2-1 load bearing mud wall
- M1- bamboo frame

Size:

2 rooms (for load bearing mud wall: stairs in the middle) and 1 storey height

Dimensions: outer size 28’x18’ (840x540cm)

Room 1: 10’x8’ (300x240cm)
Room 2: 8’x8’ (240x240cm)
Veranda: 28’x6’ (840x180cm)
Room height: 8’ (240cm)

Outer dimension of the M1 house will reduce but inside room measurement will be same. Size of house may reduce/increase considering the estimated cost.

Foundation/plinth: plinth height 1.5’-2’ (45-60cm). But during implementation it should be above normal flood or water stagnant level.

- Drainage around the house should be done
- For bamboo frame: RCC bases (katla) can be provided

Main structure:

M2- load bearing mud wall: Mud wall with vetiver, rice straw, rice husk as stabilizer

Thickness:

- External wall: 2’ (60cm)
- Stairs wall: 12’’ (30cm)

From the mezzanine level: wall height 3’ (90cm);

Reinforcement at the corner to avoid wall splitting should be done (bamboo grid);

Wall plate at the top of the wall and under beams should be used to avid cracking

- BUET should check if possible to reduce wall thickness to increase the living area

Wall thickness reduction has to consider:

- possibility of future vertical extension
- thermal insulation
- resistance earthquake

M1- bamboo frame: bamboo treatment to be done. Treated bamboo Posts on katla (RCC base with metal plate for connection inside the bamboo post to prevent rust);
BUET should check wind speed to estimate if bracing is needed

Roof:

- 4 pitch roof
- Covering: CGI sheet with timber truss for M2.
- CGI sheet with bamboo mixed truss system
- Vetiver with bamboo structure will be explored for both model

Fences:

- Stabilised mud wall for M2
- Bamboo branches mixed with mud
- Treatment for bamboo branches and leaves should be done

Openings:

- Two window per room, size: 2′×3′
- Type of shutters as for Rudrapur projects
- 1 door per room: 3′×6′

Ceiling:

- Treated bamboo for beam, bamboo slice over the main bamboo.

Open veranda:

- try to reusing old house materials

Other:

- Private and community bamboo and vetiver plantation should be encouraged
- Survey about available materials for future disaster response should be done
- Rain water harvesting system to be included
- Improved oven to be included
- Bamboo and timber plants to be provided/arranged

Beneficiaries:
Beneficiaries should be from different category of families like poorer, middle class, lower middle class. Selection of beneficiaries needs more motivation to the community then selection should be done through community approach.

Annexe 3 Cases study LCH

Three orphans are perfect beneficiary

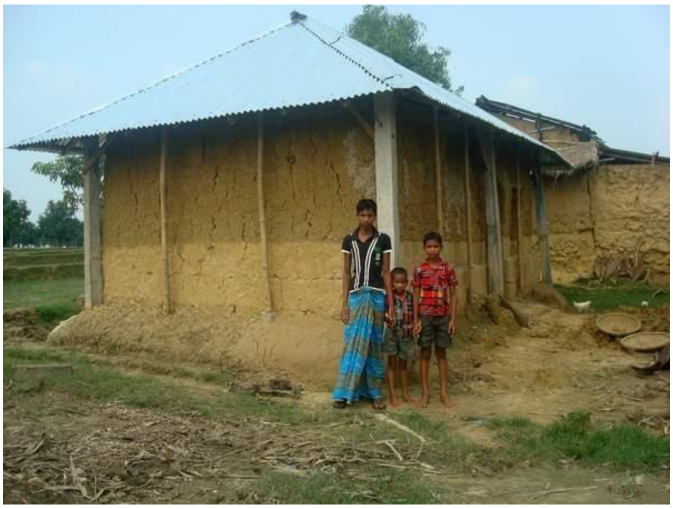
Ratan Mali is 15, Tapan Mali 10 and Sujoy Mali 8 years old are three brothers. They are orphans. For a long time their father has been suffering in diseases. Two years ago their father died. Their widow mother again married a man and she is now living with him. When she left the house, she opened the CGI sheet, door and took all things with her. In this situation Ratan’s grandmother started to taking care of these three orphan children.

They live in Uchadanga village, Under Chaor union, Upazila Porsha, Dist: Naogoan. Ratan dropped-out from class three, Tapan reads in class three and Sujoy doesn’t go to school. Ratan is now a little day labor at village level. So his income is insufficient, about 50-60 taka per day and this job is available for only 3 to 4 month in the year. It is so difficult for him to purchase food and other daily necessaries. Some times they take meal only twice a day. In this condition they are living with their grandmother in small hut in a government owned land.

In September 2011, Caritas Rajshahi Region launched Pilot Low Cost House (LCH) project in this village. In 2013 four model houses have had been constructed under this project.

In the year 2014 Caritas Rajshahi Region processed for construction of two prototype model houses of durable and disaster risk resilient LCH by using new technologies, local materials, local artisans, considering local culture for contributing local economy and environment. The project was implemented through community approach. Mr. Ratan is selected as a beneficiary through community lead beneficiary selection i.e. community people decided to provide a house to Ratan’s family. Finally a house was built for Ratan.
During construction of the house, the community people visited the construction work time to time and observed the techniques. The community people, local artisans and other person of this area learned new technologies. They expressed that they would adopt these technologies to build or repair their houses in future.

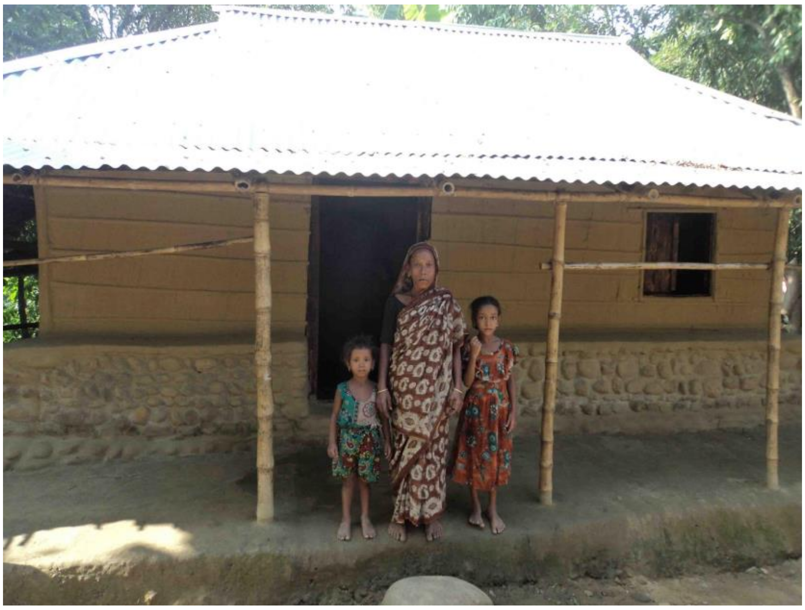
Ratan’s family is happy for living in a safe and healthy-hygienic house. They are not worried for rain and cold. They never thought that he would get such a strong and nice house. They thanked almighty God for getting this house.



Peara Begom feels safety in a disaster prototype house

Peara Begom (40) is a maid servant. She lives in Monipur village, Union: East Laxmiproshad, Upazila: Kanaighat under district of Sylhet. Monipur village is situated in the bank of the Luva River. The River is very flashy due to very adjacent to the India hill. Every year the village goes to under water due to flush flood, Peara’s husband Md. Roisuddin is a disable. He can’t do anything. Sometimes he collects some donation from the villager or goes to other villages for begging. Peara has two daughters. Elder daughter's age is eight studding in class one in a NGO school. The other’s age is five not going to school yet.

Peara Begom had a small broken hut. It was very risky for them because the house condition was vulnerable and in any natural calamities it would be broken. The PIC of the PLCH selected her as a beneficiary following the community led beneficiary selection process. She got a house with water sealed latrine. Her house was designed by the Engineers of Caritas, BUET and CRAterre. There are many innovations in the design. The house is low cost but disaster resilience. It is stone mud wall house with foundation. There are many stone remaining useless in this village; those stones used for the house. During construction of the house, total communities were engaged to implement and learn from this construction. Peara Begom is happy to have such type of low cost house with one set sanitary latrine. Community people can replicate the learning's and techniques of the low cost house construction and can minimize their house construction cost. They can use the local materials which are remaining in their village useless. Peara Begom now feels safe to live in the shelter which is strong enough. Now she has no need to think for shelter. Having shelter their social status is also increased. Her daughter is getting good environment for study. Now all the community people are sharing their knowledge about stone foundation. Peara Begom said, “Earlier we had to think not only for food also shelter. Now I am owner of a house. No need to think for shelter. It is a great opportunities for us getting this disaster prototype house.” She also said, “Our house is a special house in this village due to stone foundation mud wall house. Many villagers are visiting the house to know the technic of construction." She votes thanks to Caritas, donor and community people for providing her a disaster prototype house.



Caritas Khulna

LCH Pilot Project

Bikash's Profile:
Name: Bikas Mondal **Age:** 37
Father's Name: Kalipada Mondal
Mother's Name: Binodini Mondal
Wife's Name: Anita Mondal
Occupation: Service.
Children: One son and one daughter.
Name of Daughter: Puja Mondal (12), Class: IV, (Oral Disable)
Name of Son: Partho Mondal (8), Class: II.
Address: Village: Hashkhali, Union: Assasuni Sadar, Upazila: Assasuni, Dis: Satkira.

Hashkhali is very risky village which is situated in the union of Assasuni Sadar Union of Assasuni Upazila (Sub-district) under Satkira district. Morichap River is situated south side of this village. Bikas Mondal (37) lives in this vulnerable village. He has wife (Anita Mondal) and two children. His elder daughter reads in class IV, she is oral disable and younger one (Son) class II. He is an office peon of Bolabaria High School. He is main incoming person in his family.

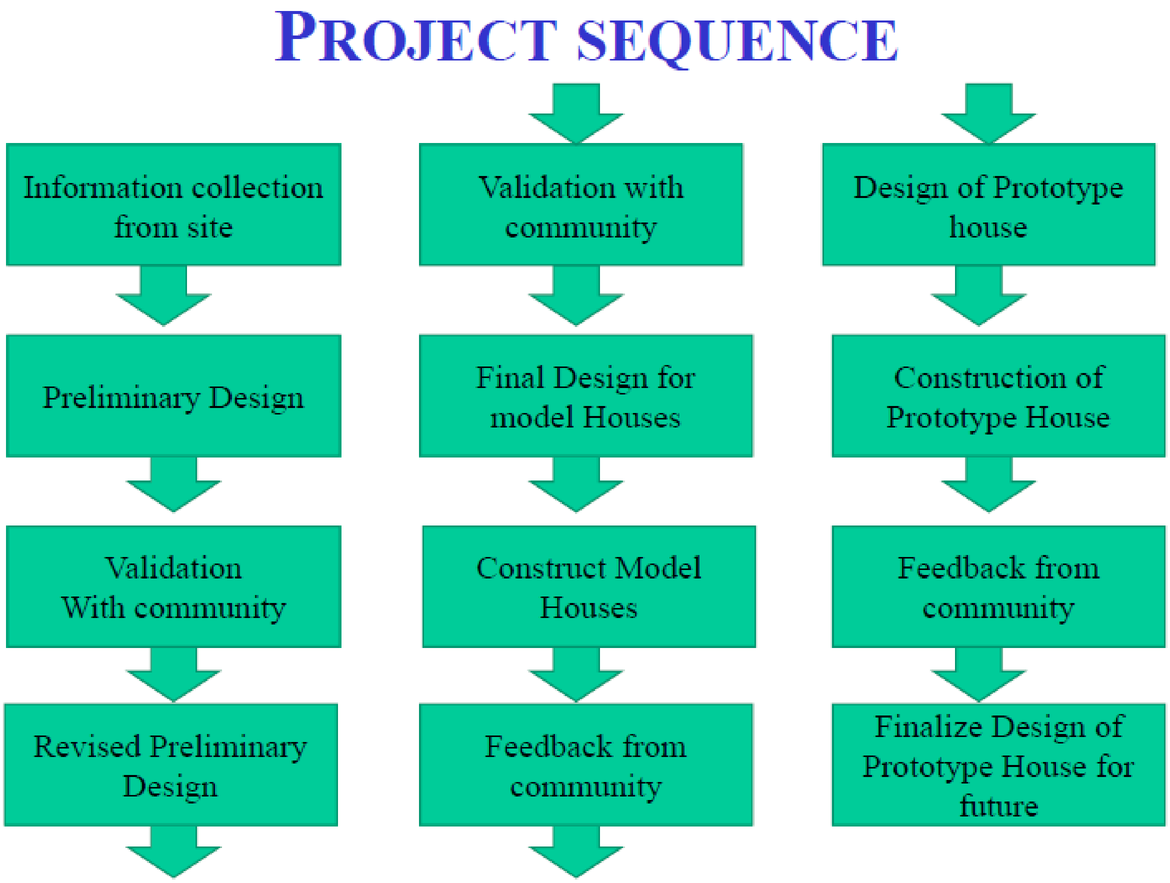
Last August 2013 he was selected as primary beneficiary of the LCH project Caritas Khulna through community meeting. After the selection PIC and Caritas representative selected him as a final beneficiary through the family survey. Under the LCH pilot Project we have decided to implement 2 houses (Model: 1 & 2) in Hashkali and Bolabair village. Bikash Mondal is the beneficiary for model: 1. Primary design (Draft) of Model: 1 prepare with consider of local house. After preparing of primary design we sent it BUET for primary finalizing. Then they resent the draft for community feedback, after BUET incorporated community feedback for finalized the design.

As per the final design from January 2014 we start Bikash Mondal's house. From the begging we give house layout with consider of local religion faith and culture. They faced a major problem to collect earth for prepare plinth. Beneficiaries also help to collect earth with the plinth labors. Artisan prepare mud wall step by step. They used bamboo slice and bamboo branches in mud wall for grow up it sustainability. We also used six RCC pillar size 11'-0'' long and 5/5'' wide for made disaster resilient house. At fast community not took RCC pillar easily. But now they except RCC pillar in their house. They also replicated RCC pillar in new construction. Community selected there plinth height with respect to previous cyclone water level. Reduce heavy wines we enter cross basing in the design.

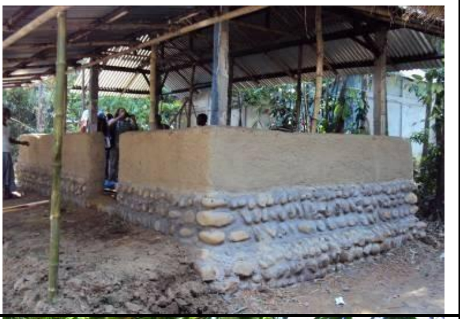
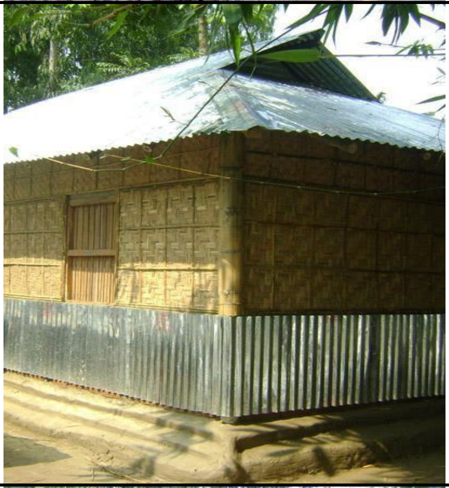
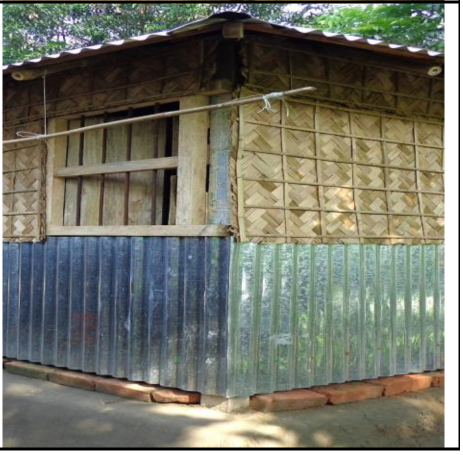
From 17th September 2014 they start to live in this house. Four side varanda is extra benefit for Bokash's family. His wife made MADUR in one side and other side using his child for study. He managed a micro solar panel from a local NGO by loan for his children study. This house construction has contributed for achieving result 2 of the project: Targeted Caritas Staff and Community construct house by using their skill and Knowledge.

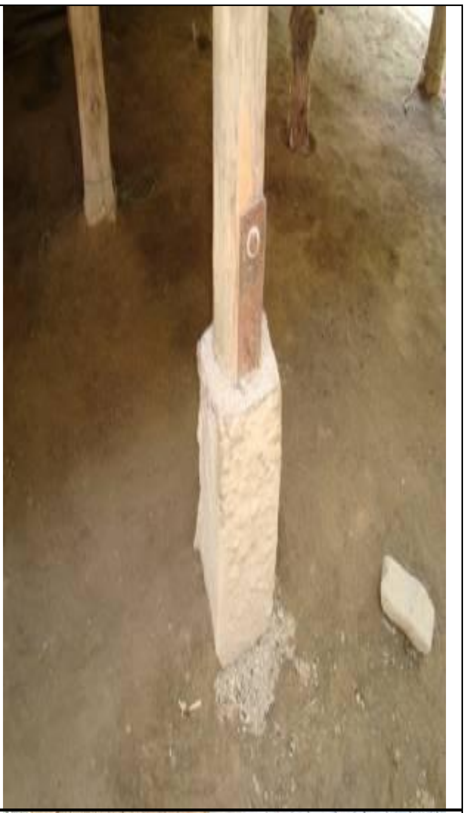
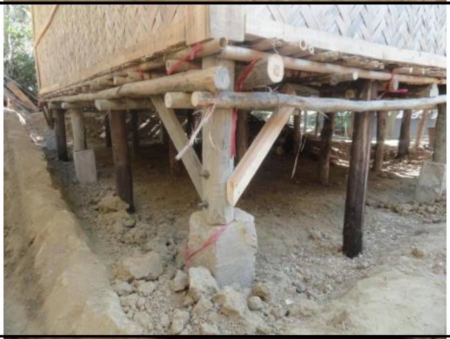
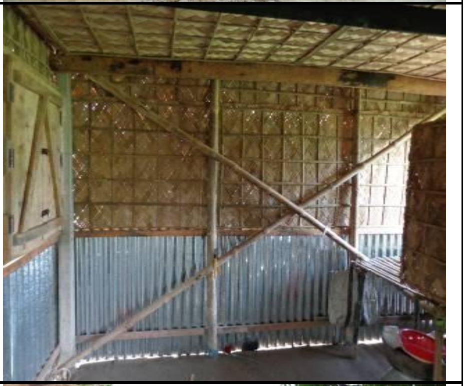
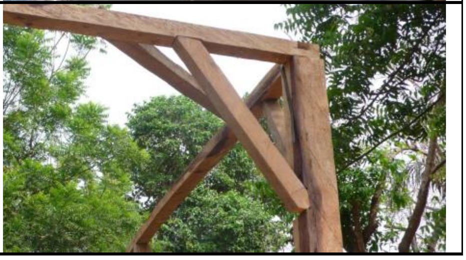
Collected By:
Hubert Sony Ratna
PO-DMD

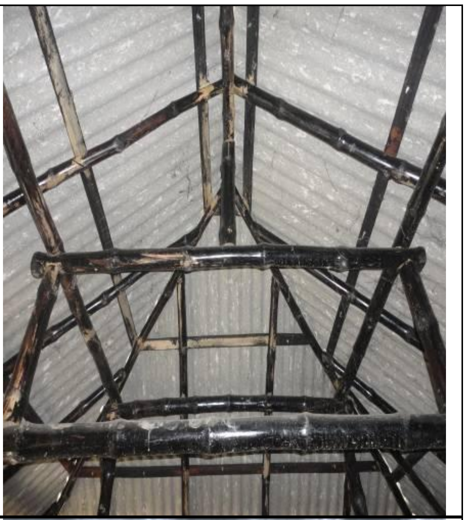
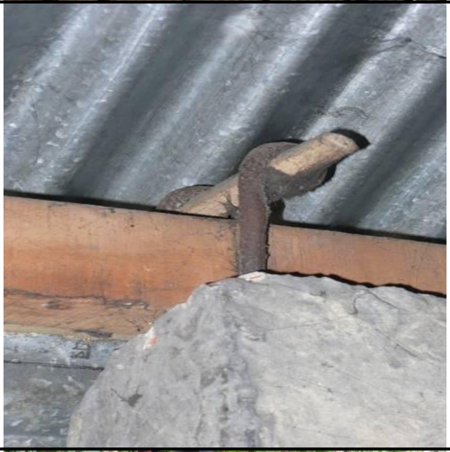
Annexe 4 Methodology for LCH design (community led design)

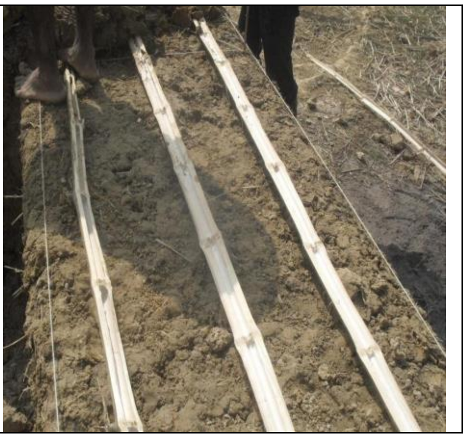

PROJECT SEQUENCE
Information collection from site
Preliminary Design
Validation With community
Revised Preliminary Design
Validation with community
Final Design for model Houses
Construct Model Houses
Feedback from community
Design of Prototype house
Construction of Prototype House
Feedback from community
Finalize Design of Prototype House for future

Annexe 5 Some innovation promoted during the project

Stone foundation with mud mortar was a innovation for flood affected area where beneficiary can collect stones. Erosion of plinth protected	
Used steps mud plinth for protecting plinth from erosion. Used double part fence with CGI sheet and bamboo mat for protecting damage of fence in the down part (if use whole fence with bamboo mat). It protects heat inside the room (when use whole fence with CGI sheet)	
Used one layer brick under the fence to protect rust in the CGI sheet	

Using *Katla* (small RC pillar) protect damaging of bamboo post. Life of bamboo post increases at least 5 times.	
Using raised *katla* for raised platform house to protect damaging of timber post. The house is built for a tribal family as per their culture and tradition.	
Cross bracing used to make the house strong against the wind pressure of storm/nor'easter.	
Corner bracing used to make the house strong against the wind pressure of storm/nor'easter	

Roof structure made using local knowledge	
Used technique to remove/open house structure easily and within short time at the river erosion area.	
Deepening of timbers in the water (water treatment) to increase life of timber.	
Using vetiver (a strong plant like straw) to increase strength of mud wall and to protect creak in the wall.	

Used bamboo slices in the mud wall to make strong wall. It will work against earthquake.	

Annexe 6 On-site training. Objectives and applications

How to help to understand why?

Visit of demo building

Visit of existing practices

How to help to understand why?

Visit of the existing

How to help to understand why?

Interview owners

Interview skilled persons

How to help to understand why?

Sharing

How to help to understand why?

Models

How to help to understand why?

Models

How to help to understand why?

Models

How to help to understand how?

To build demo houses

How to help to understand how?

Nomadic training?

How to help to understand how?

Sample walls

How to help to understand how?

Sample walls

Annexe 7 Capacity mapping for implementation of LCH

Caritas Chittagong Region

Capacity Mapping for implementation of LCH

1. **State the breakdown of material necessary for one Pilot LCH of each model / existing model then for 10, 100 and 1000 LCH:**

(Disaster Prototype traditional house .)

Items	Need for 1 LCH	10 LCH	100 LCH	1000 LCH
Timber Katla post	04 Nos	40 Nos	400 Nos	4,000 Nos
CC rest wooden post	04 Nos	40 Nos	400 Nos	4,000 Nos
Wood pillars (untreated)	N/A	N/A	N/A	N/A
Wood post (treated)	27 Nos	270Nos	2,700 Nos	27,000 Nos
WoodTie beam,Wall plate,Tie rest,Rafter,Conice	47 Nos	470 Nos	4,700 Nos	47,000 Nos
Bamboo poles (untreated)	N/A	N/A	N/A	N/A
Bamboo poles (treated)	N/A	N/A	N/A	N/A
Structural bamboo	N/A	N/A	N/A	N/A
Non structural Bamboo	580 Nos	5,800 Nos	58,000 Nos	5,80,000 Nos
Bracing	24 Nos	240 Nos	2,400 Nos	24,000 Nos
Bamboo mat type 1	N/A	N/A	N/A	N/A
Bamboo mat type 2	N/A	N/A	N/A	N/A
Tin & Ridging	32 Nos	320 Nos	3,200 Nos	32,000 Nos
Wooden planks	46 cft	460 cft	4,600 cft	46,000 cft
Plastic wire for joining	1.5 kg	15 kg	1500 kg	15,000 kg
Doors	01 Nos	10 Nos	100 Nos	1,000 Nos
Windows	02 Nos	20 Nos	200 Nos	2,000 Nos
Nails 1.5inch to 5 inch	15 kg	150 kg	1,500 kg	15,000 kg
Top Nails	05 kg	50 kg	500 kg	5,000 kg
Karosin	03 kg	30 kg	300 kg	3,000 kg
Matia Oil	8 kg	80 kg	800 kg	8,000 kg
Lock	01 Nos	10 Nos	100 Nos	1000 Nos
Hinge	20 Nos	200 Nos	2,000 Nos	20,000 Nos
Tower Bolt	03 Nos	30 Nos	300 Nos	3,000 Nos
Brick				
Nut Bolt with Washer, 07 inch	12 Nos	120 Nos	1,200 Nos	12,000 Nos
Polythene	10 Gauges	100 Gauges	1000 Gauges	10,000 Gauges
Clamp 18 inch	04 Nos	40 Nos	400 Nos	4,000 Nos

2. **State the availability of the material at the village** / *upazila*/ **district / region / country level:**

In case we will need to supply a project for 1 / 10 / 100 / 1000 LCH, where will we need to order quantities and quality to be supplied in a 06 month period?

Items	**Need for 1 LCH**	**10 LCH**	**100 LCH**	**1000 LCH**
Timber Katla post	V	V	UZ, D	Region level
CC rest wooden post	V	V	UZ, D	Region level
Wood pillars (untreated)	N/A	N/A	N/A	N/A
Wood post (treated)	V	V	UZ, D	Region level
WoodTie beam,Wall plate,Tie rest,Rafter,Conice	V	V	UZ, D	Region level
Bamboo poles (untreated)	N/A	N/A	N/A	N/A
Bamboo poles (treated)	N/A	N/A	N/A	N/A
Structural bamboo	N/A	N/A	N/A	N/A
Non structural Bamboo	V	V	UZ, D	Region level
Bracing	V	V	UZ, D	Region level
Bamboo mat type 1	N/A	N/A	N/A	N/A
Bamboo mat type 2	N/A	N/A	N/A	N/A
Tin & Ridging	V	V	UZ, D	Region level
Wooden planks	V	V	UZ, D	Region level
Plastic wire for joining	V	V	UZ, D	Region level
Doors	V	V	UZ, D	Region level
Windows	V	V	UZ, D	Region level
Nails 1.5inch to 5 inch	V	V	UZ, D	Region level
Top Nails	V	V	UZ, D	Region level
Karosin	V	V	UZ, D	Region level
Matia Oil	V	V	UZ, D	Region level
Lock	V	V	UZ, D	Region level
Hinge	V	V	UZ, D	Region level
Tower Bolt	V	V	UZ, D	Region level

Brick	V	V	UZ, D	Region level
Nut Bolt with Washer, 07 inch & 05 inch	V	V	UZ, D	Region level
Polythene	V	V	UZ, D	Region level
Clamp 18 inch	V	V	UZ, D	Region level

NOTE: V= Village, UZ = Upazila, D = District

3. What could be the necessary action to improve the delivering capacities at the local level? In normal time, during disaster response? During disaster response, what will be the option if the identified supplying solutions are affected by the disaster?

- Have to create supplier (manpower) at Upazila level through training & motivation for stock materials as per need in normal & during disaster time.
- Have to finance/cash support them (who are not capable/poor vendors/small businessman/local entrepreneur etc.) for start stocked materials as one time support/ loan.
- Community may identify the poor vendors/small businessman/local entrepreneur for finance/cash support towards start of the stocked materials.

4. What will be the environmental impact of the supplying solution chosen?

- Homestead tree plantation & garden for Tree is needed. To achieve the activities support for Homestead tree plantation

5. Who are the target group? Their strengths and weaknesses?

- Target groups are form disaster vulnerable areas. The whole community may the under project and Low Cost House is only for Poor those have dilapidated/no house and are: Hared core poor, Poor Day laborers/ low income persons who have only homestead land (050 decimal in main land, 1acre in Hilly land), Widows, Husbandless, Disable, Prolong sick persons, Women headed big family with adolescent & big family

Strength:
- Have only land for house making
- Able to hard work for living
- Able to adapt with any situation
- They know house making
- As a manpower they can easily engage with the house making

Weakness:
- Have no ability/money for built a strong house
- They have no own materials or sources (Tree, Bamboo garden etc.) for built house
- Big family but few persons for income (one/two)
- They are not skilled or have no skill training for house making

6. Is there any potential to develop the use of some existing local material to answer the needs of the LCH projects? What will be the necessary action to be implemented?

- Tree Plantation, Producing of skill manpower (artisan/carpenters) for using of modern technique to make the house, technique of treatment of Bamboo/wood, making of house with approved drawing design is needed to develop the existing local market.

- It is needed to have awareness among the community for using the local materials for making their house strong. So, awareness & motivation is effective for using of the existing materials. Leaflet, brochure, poster, billboard, advertising, local cultural show, documentary video/film show at local village level is essential. As well as training, meeting, seminar and public gathering can be arranged.

7. **State the availability of the construction capacities as well as the project management capacity at the village level / district / region / country level:**

In case we will need to construct 1 / 10 / 100 / 1000 LCH in a period of 6 month could we find the necessary human resources? Please identified organisms that can support for management and logistic.

Items	**1 LCH**	**10 LCH**	**100 LCH**	**1000 LCH**
Masons Skilled	V	V	V	UZ, D
Masons Unskilled	V	V	V	V
Carpenters Skilled	V	V	V	UZ, D
Carpenters Unskilled	V	V	V	V
trainers	UZ, D	UZ, D	UZ, D	UZ, D
supervisors	V	V	V	UZ, D
engineers	UZ, D	UZ, D	UZ, D	UZ, D, Region
management staff	Region level	Region level	Region level	Region level
logistics	UZ, D, Region	UZ, D, Region	UZ, D, Region	Region level
Accountant				
Existing Village Based Organization (VBO) able to implement	N/A	N/A	N/A	N/A
Existing Community Based Organization (CBO) able to implement	N/A	N/A	N/A	N/A
Existing NGO or local organization able to implement	N/A	N/A	N/A	N/A
Etc…				

8. What can be done to increase the response capacities at the local level?

- Producing of skill manpower (artisan/carpenters) for using of modern technique to make the house, technique of treatment of Bamboo/wood, making of house with approved drawing design is needed to increase capacities .

- Producing of skill manpower – Community persons (PIC), supervisor, engineer & Caritas Staffs (artisan/carpenters) for using of modern technique to make the house, technique of treatment of Bamboo/wood, making of house with approved drawing design is needed to increase capacities .

- It is needed to have awareness among the community for using the local materials for making their house strong. So, awareness & motivation is effective for using of the existing materials. Leaflet, brochure, poster, billboard, advertising, local cultural show, documentary video/film show at local village level is essential. As well as training, meeting, seminar and public gathering can be arranged.

9. Please comment on the issues stated below:

- Be careful, the RCC and Tin techniques actually on going in the field may be temporary solutions, this in relation to the energy crisis. There is already a tendency of people looking for alternative due to quality of tin reducing (with impact on life expectation). Due to energy crisis, people may not be able to offer it anymore in the future!!! Then, what will be the solutions? How can we help local existing knowledge to be saved / conserved/ improved, as it will not be necessary to reintroduce it in some decades, at it was the case in Europe recently…

  - Earthen tiles & Asbestoses roofing may introduced in a one or two areas as a pilot. Then awareness program may taken for the community towards using of the materials for making their house strong.

- Our project has its responsibility in this field, for example, mud building not properly assessed in Mymensingh, artisans not invited, etc.

  - Need artesian Training for improving the knowledge about new technique of LCH.

- It is necessary to have a training component in the prototype construction. If it is done under a contract, only one artisan (or few of them) will benefit from this learning experience. It will have a better impact if a strategy of training as many local artisans can be though while the prototype is constructed

  - We will agreed of training as the training is very effective for many local artisans can more expert be though while the prototype LCH construction.

- A sensitization component should be included in the field activities, Could be in direction of artisans and in direction of final client

  - We agreed to have a sensitization with awareness programmed that will helpful for effective implementation of LCH.

- Take care with the relevance of the research protocols if there if any researches are handle in the field (Same exposure of compared solutions…).

  - Exposure visit may be helpful for improvement of LCH implementation.

- Water and Sanitation Component. Think about others issues such as livelihoods/ reforestation, etc…

  - Water and Sanitation, livelihoods/ reforestation Component should included in the LCH construction.

- When analyzing the existing, think about the future? What will be the availability of material in 5, 50, 100 years?

  - Materials used in construction of LCH are available in our working areas.

- Bracing systems to be better exposed to engineers and trainees.
  - Yes.

- Disaster preparedness component to be included during the training
  - Yes.

- A small maintenance file to be provided to help beneficiaries to be aware of the specific maintenances requirements.
  - Yes.

- CB to develop a team of trainers at district / regional level.
  - Yes.

10. Develop a catalog of solutions:

Part of the building	**Existing, strength and weaknesses**	**Improvement at low cost**	**Improvement at medium cost**	**Improvement at consistent cost**
Poles	**Bamboo / Wood** Low cost Available at local level Low life expectation	Mature Seasoning Water treatment Make easy the change of damaged part with particular technical details such as bamboo footing? Embedded in plastic bags Idem and surrounded by salty sand or soil / Ash, etc…	Oil treatment Katla RCC post	Katla post + Chemical treatment Change to RCC poles
Plinth	**Mud; sacrificial** Low cost Available at local level Low life expectation Rat may come inside Thieves may dig into the houses	Rammed it properly Stabilized with vetiver	Facing the most erosion exposed side of the plinth with water resistant material (eg fired bricks laid with mud mortar then pointed with low ratio cement stabilized mortar)	Facing the four sides plinth with water resistant material (eg fired bricks laid with mud mortar then pointed with low ratio cement stabilized mortar)
Fences	**Organic material** Low cost Available at local level Low life expectation, Roots after few years	Leave a space between fence bottom and ground Move to better organic material quality Fence in different layers in order to change the lower part easily and at low cost Insert a fired brick layers under the bottom of the	Mat treatment at its bottom component Replacing bottom part of the fence by thin tin Replacing bottom part of the fence by thin treated tin Replacing bottom part of the fence by thick tin Replacing bottom part of the fence by thick treated tin	Move to thin tin for all fence Bottom treated Bottom with thik tin Treated Move to all with thick tin Bottom out of masonry 2 feet high. Etc…

		fence (with space provided) to avoid erosion and moisture upraising.		
Roof structure	**Bamboo / Wood** Low cost Available at local level Low life expectation	Four roofing house, maintaining the proper measurements, use top tie, use braching, use barack bamboo,	Four roofing house, maintaining the proper measurements, use top tie, use braching, use round wood,	Four roofing house, maintaining the proper measurements, use top tie, use braching, use barack bamboo, RCC pillar, use size wood.
Roofing/roof cover	= Use local materials. V = Chon grass, grass straw as roofing cover ,Longevity is low, after two three years need to repair	Use paddy strict, Chon grass by proper shorting.	Use paddy strict, Chon grass by proper shorting.	Use CGI sheet.
Door window	= N/A V = No window, one small window, not proper size & structure.	Use one window & door, proper size & structure.	Use two window & one door, proper size & structure.	Use four window & one door, proper size & structure.
Ceiling	= N/A V = No celling.	Use two dahra moli bamboo celling.	Use two dahra moli bamboo celling.	Use two dahra moli bamboo celling.

Field Officer(DMD)/Junior Program Officer (DMD) Program Officer (DMD)
Regional Director

Caritas Chittagong Region

Capacity Mapping for implementation of LCH

1. **State the breakdown of material necessary for one Pilot LCH of each model / existing model then for 10, 100 and 1000 LCH:**

(Disaster Protype for CMDRR project areas.)

Items	Need for 1 LCH	10 LCH	100 LCH	1000 LCH
C C Katla post	04 Nos	40 Nos	400 Nos	4,000 Nos
RCC pillars	06 Nos	60 Nos	600 Nos	6,000 Nos
Wood pillars (untreated)	N/A	N/A	N/A	N/A
Wood pillars (treated)	N/A	N/A	N/A	N/A
Bamboo poles (untreated)	N/A	N/A	N/A	N/A
Bamboo poles (treated)	14 Nos	140 Nos	1,400 Nos	14,000 Nos
Structural bamboo	05 Nos	50 Nos	500 Nos	5,000 Nos
Non structural Bamboo	580 Nos	5,800 Nos	58,000 Nos	5,80,000 Nos
Bracing	20 Nos	200 Nos	2,000 Nos	20,000 Nos
Bamboo mat type 1	N/A	N/A	N/A	N/A
Bamboo mat type 2	891 sft Tin Dhara fence	8,910 sft Tin Dhara fence	89,100 sft Tin Dhara fence	8,91,000 sft Tin Dhara fence
Tin & Ridging	48 Nos	480 Nos	4,800 Nos	48,000 Nos
Wooden planks	83 cft	830 cft	8,300 cft	83,000 cft
Wire for joining	N/A	N/A	N/A	N/A
Doors	01 Nos	10 Nos	100 Nos	1,000 Nos
Windows	04 Nos	40 Nos	400 Nos	4,000 Nos
Nails 1.5inch to 5 inch	16 kg	160 kg	1,600 kg	16,000 kg
Top Nails	06 kg	60 kg	600 kg	6,000 kg
Karosin	04 kg	40 kg	400 kg	4,000 kg
Matia Oil	8 kg	80 kg	800 kg	8,000 kg
Lock	01 Nos	10 Nos	100 Nos	1000 Nos
Hinge	32 Nos	320 Nos	3,200 Nos	32,000 Nos
Tower Bolt	05 Nos	50 Nos	500 Nos	5,000 Nos
Brick	70 Nos	700 Nos	7000 Nos	70,000 Nos
Nut Bolt with Washer, 07 inch & 05 inch	52 Nos	520 Nos	5,200 Nos	52,000 Nos
Polythene	10 Gauges	100 Gauges	1000 Gauges	10,000 Gauges
Clamp 18 inch	04 Nos	40 Nos	400 Nos	4,000 Nos

2. **State the availability of the material at the village / *upazila*/ district / region / country level:**

In case we will need to supply a project for 1 / 10 / 100 / 1000 LCH, where will we need to order quantities and quality to be supplied in a 06 month period?

Items	Need for 1 LCH	10 LCH	100 LCH	1000 LCH
C C Katla post	V	V	UZ, D	Region level
RCC pillars	V	V	UZ, D	Region level
Wood pillars (untreated)	N/A	N/A	N/A	N/A

Wood pillars (treated)	N/A	N/A	N/A	N/A
Bamboo poles (untreated)	N/A	N/A	N/A	N/A
Bamboo poles (treated)	V	V	UZ, D	Region level
Structural bamboo	V	V	UZ, D	Region level
Non structural Bamboo	V	V	UZ, D	Region level
Bracing	V	V	UZ, D	Region level
Bamboo mat type 1	N/A	N/A	N/A	N/A
Bamboo mat type 2	V	V	UZ, D	Region level
Tin & Ridging	V	V	UZ, D	Region level
Wooden planks	V	V	UZ, D	Region level
Wire for joining	N/A	N/A	N/A	N/A
Doors	V	V	UZ, D	Region level
Windows	V	V	UZ, D	Region level
Nails 1.5inch to 5 inch	V	V	UZ, D	Region level
Top Nails	V	V	UZ, D	Region level
Karosin	V	V	UZ, D	Region level
Matia Oil	V	V	UZ, D	Region level
Lock	V	V	UZ, D	Region level
Hinge	V	V	UZ, D	Region level
Tower Bolt	V	V	UZ, D	Region level
Brick	V	V	UZ, D	Region level
Nut Bolt with Washer, 07 inch & 05 inch	V	V	UZ, D	Region level
Polythene	V	V	UZ, D	Region level
Clamp 18 inch	V	V	UZ, D	Region level

NOTE: V= Village, UZ = Upazila, D = District

3. What could be the necessary action to improve the delivering capacities at the local level? In normal time, during disaster response? During disaster response, what will be the option if the identified supplying solutions are affected by the disaster?

- Have to create supplier (manpower) at Upazila level through training & motivation for stock materials as per need in normal & during disaster time.
- Have to finance/cash support them (who are not capable/poor vendors/small businessman/local entrepreneur etc.) for start stocked materials as one time support/ loan.
- Community may identify the poor vendors/small businessman/local entrepreneur for finance/cash support towards start of the stocked materials.

4. What will be the environmental impact of the supplying solution chosen?

- Homestead tree plantation & garden for Tree is needed. To achieve the activities support for Homestead tree plantation

5. Who are the target group? Their strengths and weaknesses?

- Target groups are form disaster vulnerable areas. The whole community may the under project and Low Cost House is only for Poor those have dilapidated/no house and are: Hared core poor, Poor Day laborers/ low income persons who have only homestead land (050 decimal in main land, 1acre in Hilly land), Widows, Husbandless, Disable, Prolong sick persons, Women headed big family with adolescent & big family

Strength:

- Have only land for house making

- Able to hard work for living
- Able to adapt with any situation
- They know house making
- As a manpower they can easily engage with the house making

Weakness:
- Have no ability/money for built a strong house
- They have no own materials or sources (Tree, Bamboo garden etc.) for built house
- Big family but few persons for income (one/two)
- They are not skilled or have no skill training for house making

6. Is there any potential to develop the use of some existing local material to answer the needs of the LCH projects? What will be the necessary action to be implemented?

- Tree Plantation, Producing of skill manpower (artisan/carpenters) for using of modern technique to make the house, technique of treatment of Bamboo/wood, making of house with approved drawing design is needed to develop the existing local market.

- It is needed to have awareness among the community for using the local materials for making their house strong. So, awareness & motivation is effective for using of the existing materials. Leaflet, brochure, poster, billboard, advertising, local cultural show, documentary video/film show at local village level is essential. As well as training, meeting, seminar and public gathering can be arranged.

7. **State the availability of the construction capacities as well as the project management capacity at the village level / district / region / country level:**

In case we will need to construct 1 / 10 / 100 / 1000 LCH in a period of 6 month could we find the necessary human resources? Please identified organisms that can support for management and logistic.

Items	**1 LCH**	**10 LCH**	**100 LCH**	**1000 LCH**
Masons Skilled	V	V	V	UZ, D
Masons Unskilled	V	V	V	V
Carpenters Skilled	V	V	V	UZ, D
Carpenters Unskilled	V	V	V	V
trainers	UZ, D	UZ, D	UZ, D	UZ, D
supervisors	V	V	V	UZ, D
engineers	UZ, D	UZ, D	UZ, D	UZ, D, Region
management staff	Region level	Region level	Region level	Region level
logistics	UZ, D, Region	UZ, D, Region	UZ, D, Region	Region level
Accountant				
Existing Village Based Organization (VBO) able to implement	N/A	N/A	N/A	N/A
Existing Community Based Organization (CBO) able to implement	N/A	N/A	N/A	N/A
Existing NGO or local organization able to implement	N/A	N/A	N/A	N/A
Etc…				

8. What can be done to increase the response capacities at the local level?

- Producing of skill manpower (artisan/carpenters) for using of modern technique to make the house, technique of treatment of Bamboo/wood, making of house with approved drawing design is needed to increase capacities .

- Producing of skill manpower – Community persons (PIC), supervisor, engineer & Caritas Staffs (artisan/carpenters) for using of modern technique to make the house, technique of treatment of Bamboo/wood, making of house with approved drawing design is needed to increase capacities .

- It is needed to have awareness among the community for using the local materials for making their house strong. So, awareness & motivation is effective for using of the existing materials. Leaflet, brochure, poster, billboard, advertising, local cultural show, documentary video/film show at local village level is essential. As well as training, meeting, seminar and public gathering can be arranged.

9. Please comment on the issues stated below:

- Be careful, the RCC and Tin techniques actually on going in the field may be temporary solutions, this in relation to the energy crisis. There is already a tendency of people looking for alternative due to quality of tin reducing (with impact on life expectation). Due to energy crisis, people may not be able to offer it anymore in the future!!! Then, what will be the solutions? How can we help local existing knowledge to be saved / conserved/ improved, as it will not be necessary to reintroduce it in some decades, at it was the case in Europe recently…

  - Earthen tiles & Asbestoses roofing may introduced in a one or two areas as a pilot. Then awareness program may taken for the community towards using of the materials for making their house strong.

- Our project has its responsibility in this field, for example, mud building not properly assessed in Mymensingh, artisans not invited, etc.

- Need artesian Training for improving the knowledge about new technique of LCH.

- It is necessary to have a training component in the prototype construction. If it is done under a contract, only one artisan (or few of them) will benefit from this learning experience. It will have a better impact if a strategy of training as many local artisans can be though while the prototype is constructed
  - We will agreed of training as the training is very effective for many local artisans can more expert be though while the prototype LCH construction.

- A sensitization component should be included in the field activities, Could be in direction of artisans and in direction of final client

  - We agreed to have a sensitization with awareness programmed that will helpful for effective implementation of LCH.

- Take care with the relevance of the research protocols if there if any researches are handle in the field (Same exposure of compared solutions…).

  - Exposure visit may be helpful for improvement of LCH implementation.

- Water and Sanitation Component. Think about others issues such as livelihoods/ reforestation, etc…
  - Water and Sanitation, livelihoods/ reforestation Component should included in the LCH construction.

- When analyzing the existing, think about the future? What will be the availability of material in 5, 50, 100 years?

- Materials used in construction of LCH are available in our working areas.

- Bracing systems to be better exposed to engineers and trainees.
  - Yes.

- Disaster preparedness component to be included during the training
  - Yes.

- A small maintenance file to be provided to help beneficiaries to be aware of the specific maintenances requirements.
  - Yes.

- CB to develop a team of trainers at district / regional level.
  - Yes.

10. Develop a catalog of solutions:

Part of the building	**Existing, strength and weaknesses**	**Improvement at low cost**	**Improvement at medium cost**	**Improvement at consistent cost**
Poles	**Bamboo / Wood** Low cost Available at local level Low life expectation	Mature Seasoning Water treatment Make easy the change of damaged part with particular technical details such as bamboo footing? Embedded in plastic bags Idem and surrounded by salty sand or soil / Ash, etc…	Oil treatment Katla RCC post	Katla post + Chemical treatment Change to RCC poles
Plinth	**Mud; sacrificial** Low cost Available at local level Low life expectation Rat may come inside Thieves may dig into the houses	Rammed it properly Stabilized with vetiver	Facing the most erosion exposed side of the plinth with water resistant material (eg fired bricks laid with mud mortar then pointed with low ratio cement stabilized mortar)	Facing the four sides plinth with water resistant material (eg fired bricks laid with mud mortar then pointed with low ratio cement stabilized mortar)
Fences	**Organic material** Low cost Available at	Leave a space between fence bottom and ground	Mat treatment at its bottom component Replacing bottom part	Move to thin tin for all fence Bottom treated

	local level Low life expectation, Roots after few years	Move to better organic material quality Fence in different layers in order to change the lower part easily and at low cost Insert a fired brick layers under the bottom of the fence (with space provided) to avoid erosion and moisture upraising.	of the fence by thin tin Replacing bottom part of the fence by thin treated tin Replacing bottom part of the fence by thick tin Replacing bottom part of the fence by thick treated tin	Bottom with thik tin Treated Move to all with thick tin Bottom out of masonry 2 feet high. Etc…
Roof structure	**Bamboo / Wood** Low cost Available at local level Low life expectation	Four roofing house, maintaining the proper measurements, use top tie, use braching, use barack bamboo,	Four roofing house, maintaining the proper measurements, use top tie, use braching, use round wood,	Four roofing house, maintaining the proper measurements, use top tie, use braching, use barack bamboo, RCC pillar, use size wood.
Roofing/roof cover	S = Use local materials. W = Chon grass, grass straw as roofing cover ,Longevity is low, after two three years need to repair	Use paddy strict, Chon grass by proper shorting.	Use paddy strict, Chon grass by proper shorting.	Use CGI sheet.
Door window	S = N/A W = No window, one small window, not proper size & structure.	Use one window & door, proper size & structure.	Use two window & one door, proper size & structure.	Use four window & one door, proper size & structure.
Ceiling	S = N/A W = No celling.	Use two dahra moli bamboo celling.	Use two dahra moli bamboo celling.	Use two dahra moli bamboo celling.

Field Officer(DMD)/Junior Program Officer (DMD) Program Officer (DMD) Regional Director

Caritas Sylhet Region
Capacity Mapping for Implementation of LCH

1. State the breakdown of material necessary for one Pilot LCH of each model / existing model then for 10, 100 and 1000 LCH:

Items	Need for 1 LCH	10 LCH	100 LCH	1000 LCH
Katla Post	08 No’s	80 No’s	800 No’s	8000 No’s
RCC Pillars	04 No’s	40 No’s	400 No’s	4000 No’s
Wood Pillars (Untreated)	-	-	-	-
Wood Pillars (Treated)	-	-	-	-
Bamboo Poles Untreated)	11 No’s	110 No’s	1100 No’s	11000 No’s
Bamboo Poles (Treated)	18 No’s	180 No’s	1800 No’s	18000 No’s
Structural Bamboo	6 No’s	60 No’s	600 No’s	6000 No’s
Non Structural Bamboo	10 No’s	100 No’s	1000 No’s	10000 No’s
Bracing	20 No’s	200 No’s	2000 No’s	20000 No’s
Bamboo Mad Type-1	01 No’s			
Bamboo Mad Type-2	-	-	-	-
Tin & Ridging	34 & 11 No’s	340 & 110 No’s	3400 & 1100 No’s	34000 & 11000 No’s
Wooden Planks	-	-	-	-
Wire for Joining	80 No’s	800 No’s	8000 No’s	80000 No’s
Doors	01 No’s	10 No’s	100 No’s	1000 No’s
Windows	03 No’s	30 No’s	300 No’s	3000 No’s
Nails 1.5” inch to 5” inch	10 Kg	100 Kg	1000 Kg	10000 No’s
Top Nails	250 No’s	2500 No’s	25000 No’s	250000 No’s
Karosin	-	-	-	-
Matia Oil	2 Tin	20 Tin	200 Tin	2000 Tin
Lock	1 No’s	10 No’s	100 No’s	1000 No’s
Hinge	20 No’s	200 No’s	2000 No’s	20000 No’s
Tower Bolt	-	-	-	-
Nut-Bolt	40 No’s	400 No’s	4000 No’s	40000 No’s

2. State the availability of the materials at the village/Upazila/District/Region/Country level:

In crease we will need to supply a project for 1/10/100/1000 LCH, where will we need to order quantities and quality to be supplied in a 06 month period?

- The Items materials six month period possible under details below:

Items	Need for 1 LCH	10 LCH	100 LCH	1000 LCH
Katla Post	Sorokerbazar	Sorokerbazar	Sosokerbazar	Sylhet
RCC Pillars	Sorokerbazar	Sorokerbazar	Sorokerbazar	Sylhet

Wood Pillars (Untreated)	Momotajgonj	Sorokerbazar	Sorokerbazar	Sylhet
Wood Pillars (Treated)	Momotajgonj	Sorokerbazar	Sorokerbazar	Sylhet
Bamboo Poles (Untreated)	Momotajgonj	Momotajgonj	Sorokerbazar + Kanaighat	Sylhet
Bamboo Poles (Treated)	Momotajgonj	Momotajgonj	Sorokerbazar + Kanaighat	Sylhet
Structural Bamboo	Momotajgonj	Momotajgonj	Sorokerbazar + Kanaighat	Sylhet
Non Structural Bamboo	Momotajgonj	Momotajgonj	Sorokerbazar + Kanaighat	Sylhet
Bracing	Momotajgonj	Sorokerbazar	Sorokerbazar	Sylhet
Bamboo Mud Type-1	-	-	-	-
Bamboo Mud Type-2	-			-
Tin & Ridging	Sorokerbazar	Kanaighat	Kanaighat	Sylhet
Wooden Planks	Momotajgonj	Momotajgonj	Sorokerbazar	Sylhet
Wire for Joining	Sorokerbazar	Sorokerbazar	Kanaighat	Sylhet
Doors	Sorokerbazar	Sorokerbazar	Sorokerbazar	Sylhet
Windows	Sorokerbazar	Sorokerbazar	Sorokerbazar	Sylhet
Nails	Sorokerbazar	Sorokerbazar	Kanaighat	Sylhet

3. What could be the necessary action to improve the delivering capacities at the local level? In normal time, during disaster response? During disaster response, what will be the option if the identified supply solutions are affected by the disaster?

To improve the delivering capacities at the local level to taken following action:

In normal time:

- Improve the communication system.
- Communication with local government, Community people and local elites
- Good communication with transport authority.
- Inform the forest department

During disaster response:

- Improve the communication system.
- Need to be improved communication with transport authority.
- At first need safety and security.
- Asking help from local government, Community people and local elites
- Communication with GO and NGO for help.
- Information to forest department

If the identified supply solutions are affected by the disaster:

- Collaborate with GO/NGO
- Asking suggestion and instruction from National Office.

4. What will be the environmental impact of the supply solution chosen?

- Some trees need be cut for house making
- Some roads will be damaged for carrying materials.

5. Who are the target group? Their strengths and weaknesses?

Target Group:

- Union Parishad
- Project implementation committee

- Mason
- Carpenter
- Mud wall mason
- Wood supplier
- Stone supplier
- Bamboo supplier
- Fence maker and supplier
- Beneficiary

Strengths:

- Project implementation committee has voluntary mentality.
- Appropriate materials will be supplied by the suppliers.
- Suppliers have valid license
- Masons are skilled and trained up.
- Suppliers will receive Account payee cheque.

Weaknesses:

- LCH Drawing and design is very new for the masons.
- Masons are not punctual.

6. In there any potential to develop the use of some existing local material to answer of the LCH project? What will be necessary action to be implemented?

Some existing potential local materials like ekor and stone; to preserve these materials we need conduct awareness meeting.

7. In case we will need to construct 1/10/100/1000 LCH in a period of 6 month could we find the necessary human resources? Please identified organisms that can support for management and logistic.

Items	**1 LCH**	**10 LCH**	**100 LCH**	**1000 LCH**
Masons Skilled	01 Person	2 Person	4 Person	10 Person
Masons Unskilled	01 "	2 "	8 "	20 "
Carpenters Skilled	01 "	2 "	4 "	30 "
Carpenters Unskilled	01 "	2 "	8 "	90 "
Trainers	01 "	1 "	1 "	2 "
Supervisors	01 "	1 "	2 "	10 "
Engineers	01 "	1 "	1 "	2 "
Management Staff	1	1	3	5
Logistics	1	1	1	2
Accountant	0	0	1	1
Existing Village Based Organization (VBO) able to Implement	1	1	4	40
Existing Community Based Organization (CBO) able to Implement	1	1	4	40
Existing NGO or Local Organization able to Implement	1	1	1	1
Etc…				

8. What can be done to increase the response capacities at the local level?

- Local level committee formation
- Task force formation
- Provide need base training
- Organize awareness meeting & workshop.
- Replicate the learning's and knowledge's of PLCH project.
- Networking with GO/NGO

9. Please comment on the issues stated below:

- Be careful, the RCC and Tin techniques actually ongoing in the field may be temporary solutions, this in relation to the energy crisis. There is already a tendency of people looking for alternative due to quality of tin reducing (with impact on life expectation). Due to energy crisis, people may not be able to offer it anymore in the future!!! Then, what will be the solutions? How can we help local existing knowledge to be saved / conserved/ improved, as it will not be necessary to reintroduce it in some decades, at it was the case in Europe recently…
- People may use the local materials for LCH making and can use their local knowledge and traditional practices. They may replicate the learning's to others.

- Our project has its responsibility in this field, for example, mud building not properly assessed in Mymensingh, artisans not invited, etc…
- We assessed our existing houses in our working area properly and artisans are inviting in our activities.

- It is necessary to have a training component in the prototype construction. If it is done under a contract, only one artisan (or few of them) will benefit from this learning experience. It will have a better impact if a strategy of training as many local artisans can be though while the prototype is constructed
- Yes, we agree with this and we will try to engage more artisans in our LCH construction period and training session.

- A sensitization component should be included in the field activities, Could be in direction of artisans and in direction of final client
- The direction is giving by national office and accordingly we are following the direction.

- Take care with the relevance of the research protocols if there if any researches are handle in the field (Same exposure of compared solutions…).
- Thanks for reminder and we see it.

- Water and Sanitation Component. Think about others issues such as livelihoods/ reforestation, etc…
- We will do so.

- When analyzing the existing, think about the future? What will be the availability of material in 5, 50, 100 years?
- After five years it will be little available but after 50 and 100 years the materials will be not available.

- Bracing systems to be better exposed to engineers and trainees.
- Yes, that is.

- Disaster preparedness component to be included during the training
- Disaster preparedness component is already included for training session.

- A small maintenance file to be provided to help beneficiaries to be aware of the specific maintenances requirements.

- It is needed to implement.

- CB to develop a team of trainers at district / regional level.
- It is very essential for replication the learning and knowledge of LCH.

10. Develop a catalog of solutions:

Part of the building	Existing, strength and weaknesses	Improvement at low cost	Improvement at medium cost	Improvement at consistent cost
Poles	Strength: Using bamboo and RCC pillar Weakness: Bamboos are not treated and RCC pillars are not made following the construction code.	Bamboo poles should to be treated.	Bamboo poles should to be treated and need to be made the RCC pillars following the construction code.	Bamboo poles using katla joint and corner bracing, Water treatment. RCC pillar need to be constructed by following construction code.
Plinth	Strength: Made of hard mud and minimum one feet height. Veakness: Damaging by rain water	Three steps plinth and two feet height	Three steps plinth and minimum two feet height	Three steps plinth and minimum two feet height
Fences	Strength: Made of Ekor and bamboo fences. Available in the local area. Veakness: Due to mud level installation it is lasting only one year.	Two parts fence. Use CGI sheets on mud level.	Two or three parts fence. Use CGI sheets on mud level.	Two or three parts fence. Use CGI sheets on mud level.
Roof structure	Strength: Made of Bamboo and wood Veakness: In the many houses are not using matia and kerosene	Wooden and bamboo. Treated and using Matia and kerosene	Wooden and bamboo. Treated and using Matia and kerosene	Wooden. Treated and using Matia and kerosene
Roofing/roof cover	Strength: CGI sheet Veakness: Low quality	CGI sheet with medium quality	CGI sheet with high quality	CGI sheet with high quality
Door	Strength: Using	Use of wooden,	Use of wooden, CI	Use of wooden, CI

window	Bamboo fence, CI plan sheet and wooden Weakness: In many houses are not using window and the size of doors are undersize.	CI plan sheet and minimum two windows and one door	plan sheet and minimum two windows and one door	plan sheet and minimum two windows and one door
Ceiling	Strength: Made of bamboo Weakness: 90 % houses are not covered by ceiling	Bamboo fence and treated.	Bamboo fence treated and colored.	Bamboo fence treated and colored.

Caritas Mymensingh Region
Capacity Mapping for implementation of LCH

1. State the breakdown of material necessary for one Pilot LCH of each model / existing model then for 10, 100 and 1000 LCH:

Items	Need for 1 LCH	10 LCH	100 LCH	1000 LCH
Katla post	8 Nos	80 Nos	800 Nos	8000 Nos
RCC pillars	8 Nos	80 Nos	800 Nos	8000 Nos
Wood pillars (untreated)	-	-	-	-
Wood pillars (treated)	-	-	-	-
Bamboo poles (untreated)	10 Nos	100 Nos	1000 Nos	10,000 Nos
Bamboo poles (treated)	10 Nos	100 Nos	1000 Nos	10000Nos
Structural bamboo	4 Nos	40 Nos	400 Nos	4000 Nos
Non structural Bamboo	12 Nos	120 Nos	1200 Nos	12 000Nos
Bracing	12 Nos	120 Nos	1200 Nos	12,000Nos
Bamboo mat type 1	215 Sft	2150 Sft	21500 Sft	215000 Sft
Bamboo mat type 2	150 Sft	1500 Sft	15000 Sft	150000 Sft
Fencing (CGI)	1.33 Bundle	13.3 Bundle	133 Bundle	1330 Bundle
Tin	3.5 Bundle	35 Bundle	350 Bundle	3500 Bundle
Ridging	12 Nos	120 Nos	1200 Nos	12000 Nos
Wooden planks	27.5 Cft	275 Cft	2750 Cft	27500 Cft
Wire for joining	1 Kg	10 Kg	100 Kg	1000 Kg
Doors	1 Nos	10 Nos	100 Nos	1000 Nos
Windows	3 Nos	30 Nos	300 Nos	3000 Nos
Nails 1.5inch to 5 inch	3 Kg	30 Kg	300 Kg	3000 Kg
Top Nails	230 Nos	2300 Nos	23000 Nos	230000 Nos
Karosin	5 Litre	50 Litre	500 Litre	5000 Litre
Matia Oil	8 Litre	80 Litre	800 Litre	8000 Litre
Lock	1 Nos	10 Nos	100 Nos	1000 Nos
Hinge	15 Nos	150 Nos	1500 Nos	15000 Nos
Tower Bolt	4 Nos	40 Nos	400 Nos	4000 Nos

2. State the availability of the material at the village / *upazila*/ district / region / country level:

In case we will need to supply a project for 1 / 10 / 100 / 1000 LCH, where will we need to order quantities and quality to be supplied in a 06 month period?

Items	1 LCH	10 LCH	100 LCH	1000 LCH
Katla post	Village	Union market	Upazila	Upazila
RCC pillars	Village	Union market	Upazila	Upazila
Wood pillars (untreated)				
Wood pillars (treated)				
Bamboo poles (untreated)	Village	Village	Union market	Upazila
Bamboo poles (treated)	Village	Village	Union market	Upazila
Structural bamboo	Village	Village	Union market	Upazila
Non structural Bamboo	Village	Village	Union market	Upazila

Bracing	Village	Village	Union market	Upazila
Bamboo mat type 1	Village	Union market	Upazila	Upazila
Bamboo mat type 2	Village	Union market	Upazila	Upazila
Fencing (CGI)	Union market	Union market	Upazila	Distrect
Tin	Union market	Union market	Upazila	Distrect
Wooden planks	Village	Union market	Upazila	Upazila
Wire for joining	Village	Union market	Union market	Upazila
Doors	Village	Union market	Upazila	Upazila
Windows	Village	Union market	Upazila	Upazila
Nails	Village	Union market	Upazila	Upazila

3. What could be the necessary action to improve the delivering capacities at the local level? In normal time, during disaster response? During disaster response, what will be the option if the identified supplying solutions are affected by the disaster?

Normal Time:
- Communicate in advance with the local suppliers so that they can collect and supply in due time.
- Informing the local respective suppliers about the required materials that we will use in the houses.

During disaster response:
- If identified supply solution is affected, the markets/suppliers of nearby Union/Upozila which are not affected can be chosen.

4. What will be the environmental impact of the supplying solution chosen?

Considering the environmental impact, local and natural materials like bamboo, wood etc. will be used in construction. Local resources will be used in most of the construction.

5. Who are the target group? Their strengths and weaknesses ?

The local suppliers, masons, carpenters, skilled labours are the target group.

Strength:
- Local suppliers can supply the local resources and materials in sort time with minimum cost. The caring cost will also be minimized.
- Local masons, carpenters and labours are already knowledgeable on the local practices of housing. They will be known by the selected beneficiaries as well and the relationship will be supportive to achieve the construction quality.

Weakness:
- If the supply amount is too bulk, it may not be possible to supply in due time by the local suppliers.
- The number and skill of local masons and carpenters may not good enough to complete a big number of house construction in short time.

6. Is there any potential to develop the use of some existing local material to answer the needs of the LCH projects? What will be the necessary action to be implemented?

There is significant possibilities to use the local materials especially the bamboo, wood, bamboo fence, mud etc. Required actions are:
- Designing using local materials
- Sensitizing the community on using local materials.
- Informing/communicating the local suppliers in advance on the same.

7. State the availability of the construction capacities as well as the project management capacity at the village level / district / region / country level:

In case we will need to construct 1 / 10 / 100 / 1000 LCH in a period of 6 month could we find the necessary human resources? Please identified organisms that can support for management and logistic.

Items	**1 LCH**	**10 LCH**	**100 LCH**	**1000 LCH**
Masons Skilled	Village level	Village level	Union	Upazila
Masons Unskilled	Village level	Village level	Union	Upazila
Carpenters Skilled	Village level	Village level	Union	Upazila
Carpenters Unskilled	Village level	Village level	Union	Upazila
trainers	Region	Region	Region	Region
supervisors	Village level	Village level	Upazila	Region
engineers	Region	Region	Region	Region
management staff	Region	Region	Region	Region
logistics	Upazila	Upazila	Region	Region
Accountant	Region	Region	Region	Region
Existing Village Based Organization (VBO) able to implement	Village level	Village level	Union	Upazila
Existing Community Based Organization (CBO) able to implement	Village level	Village level	Union	Upazila
Existing NGO or local organization able to implement	Union	Union	Upazila	Upazila
Etc…				

8. What can be done to increase the response capacities at the local level?

- Orientation for the local people, local govt. and administration on the project to make them knowledgeable on what we are going to do and how can they provide support.
- Formation of active local implementation committee.
- Train the local mason and carpenter.
- Linkage with the local market and suppliers in advance.
- Sufficient number of qualified stuff with satisfactory package of salary.

9. Please comment on the issues stated below:

- Be careful, the RCC and Tin techniques actually ongoing in the field may be temporary solutions, this in relation to the energy crisis. There is already a tendency of people looking for alternative due to quality of tin reducing (with impact on life expectation). Due to energy crisis, people may not be able to offer it anymore in the future!!! Then, what will be the solutions? How can we help local existing knowledge to be saved / conserved/ improved, as it will not be necessary to reintroduce it in some decades, at it was the case in Europe recently…
  - Local practices of house construction and demand of local people should always be considered in the design and budgeting stage.

- Our project has its responsibility in this field, for example, mud building not properly assessed in Mymensingh, artisans not invited, etc…

    - Practice of mud building varies according to the geographical area and on the type of disaster people face.

- It is necessary to have a training component in the prototype construction. If it is done under a contract, only one artisan (or few of them) will benefit from this learning experience. It will have a better impact if a strategy of training as many local artisans can be though while the prototype is constructed

    - Learning by doing will be the best. We just may have to consider the cost of involving that many artisans for training -cum-construction of prototype houses.

- A sensitization component should be included in the field activities, Could be in direction of artisans and in direction of final client.

    - Sensitization session after completion of construction by the artisans, final client and Local Committee members was found effective last time.

- Take care with the relevance of the research protocols if there if any researches are handle in the field (Same exposure of compared solutions…).

- Water and Sanitation Component. Think about others issues such as livelihoods/ reforestation, etc…
    - If some beneficiaries already have good sanitation, then we can go for livelihoods/ reforestation as well.

- When analyzing the existing, think about the future? What will be the availability of material in 5, 50, 100 years?

- Bracing systems to be better exposed to engineers and trainees.
    - This is ongoing and found effective by the community people.

- Disaster preparedness component to be included during the training

    - A common training schedule including disaster preparedness component will be helpful.

- A small maintenance file to be provided to help beneficiaries to be aware of the specific maintenances requirements.

    - This can be pictorial to ensure better understanding by the beneficiaries.

- CB to develop a team of trainers at district / regional level.

    - Respective field officers and PO's are being developed.

10. Develop a catalog of solutions:

Part of the building	**Existing, strength and weaknesses**	**Improvement at low cost**	**Improvement at medium cost**	**Improvement at consistent cost**
Poles				
Plinth				
Fences				
Roof structure				
Roofing/roof cover				
Door window				
Ceiling				

Field Officer(DMD)/Junior Program Officer (DMD) Program Officer (DMD) Regional Director

Caritas Khulna Region

Capacity Mapping for implementation of LCH

1. State the breakdown of material necessary for one Pilot LCH of each model / existing model then for 10, 100 and 1000 LCH:

Items	Need for 1 LCH	10 LCH	100 LCH	1000 LCH
Katla post	8	80	800	8000
CC pillars	0	0	0	0
Wood pillars (untreated)	0	0	0	0
Wood pillars (treated)	0	0	0	0
Bamboo poles (untreated)	15	150	1500	15000
Bamboo poles (treated)	4	40	400	4000
Structural bamboo	12	120	1200	12000
Non structural Bamboo	0	0	0	0
Bracing	0	0	0	0
Bamboo mat type 1	0	0	0	0
Bamboo mat type 2	0	0	0	0
Tin & Ridging	27	270	2700	27000
Wooden planks	12	120	1200	12000
Wire for joining	10	100	1000	10000
Doors	2	20	200	2000
Windows	2	20	200	2000
Nails 1.5inch to 5 inch	1	10	100	1000
Top Nails	2	20	200	2000
Karosin	2	20	200	2000
Matia Oil	2	20	200	2000
Lock	4	40	400	4000
Hinge		0	0	0
Tower Bolt	200	2000	20000	200000
	400	4000	40000	400000

2. State the availability of the material at the village / *upazila*/ district / region / country level:

In case we will need to supply a project for 1 / 10 / 100 / 1000 LCH, where will we need to order quantities and quality to be supplied in a 06 month period?

Items	1 LCH	10 LCH	100 LCH	1000 LCH
Katla post	Village	Village	Upzila	District
RCC pillars				
Wood pillars (untreated)				
Wood pillars (treated)				
Bamboo poles (untreated)	Upzila	Upzila	District	Region
Bamboo poles (treated)	Upzila	Upzila	District	Region
Structural bamboo	Upzila	Upzila	District	Region
Non structural Bamboo				
Bracing				

Bamboo mat type 1				
Bamboo mat type 2				
Tin	Upzila	District	District	Region
Wooden planks	Upzila	District	District	Region
Wire for joining	Upzila	District	District	District
Doors	Upzila	Upzila	District	Region
Windows	Upzila	Upzila	District	District
Nails	Upzila	Upzila	District	District
Tails	District	District	District	District

3. What could be the necessary action to improve the delivering capacities at the local level? In normal time, during disaster response? Train up to local artisan.

- Use of local laborers, artisan and carpenters for the construction of houses.
- Using local materials.
- Encourage to planted Golpata, Bamboo and Tree.
- Model House construction.
- Purchase small materials from the local market.
- Ensure our need to local market.
- Ensure the communities participation with all activities.
- Easy techniques apply to build the LCH.
- House materials will be use low cost and strong enough.
- Discuses with local communities about participatory model house design. Its weakness, good side and house strength capacity in disaster period.
- Make sure the communities behavioral change to introduce new house construction.
- Encourage to local venders to supply.
- Using same technology and same materials for all houses.
- Enhance local small factory.

During disaster response, what will be the option if the identified supplying solutions are affected by the disaster?

- Local trained artisan will be help.
- Provide materials from District or Regional level.
- Take step to build capacity of local supplier.

4. What will be the environmental impact of the supplying solution chosen?

Good side:

- Tree plantation is effective way to reduce environmental vulnerability.
- Local community will get job in local market and house work.
- Enhance the local skilled Artisan.
- Community will full fill there need form local market.
- Increase local vendor/ suppliers.

Bad side:

- Some factory is totally depended on fire and mud like tails and break. It will be affected on environment.
- Full CGI sheet provide houses is like a fire box. Babies are not feeling comfortable to live in this type of house naturally.

5. Who are the target group? Their strengths and weaknesses?

Strength:

Weakness:

6. Is there any potential to develop the use of some existing local material to answer the needs of the LCH projects? What will be the necessary action to be implemented?

- Ensuring the local materials delivery from local market. (As like tails)
- Improve the local artisan skills.
- Planting local house uses tree and Golpata.
- More practicing to using existing material by demonstration model houses.
- Prove and using the local knowledge the existing materials strength to reducing disaster risk with community level.
- Finding the easy and low cost construction system by existing materials.

7. State the availability of the construction capacities as well as the project management capacity at the village level / district / region / country level:

In case we will need to construct 1 / 10 / 100 / 1000 LCH in a period of 6 month could we find the necessary human resources? Please identified organisms that can support for management and logistic.

Items	**1 LCH**	**10 LCH**	**100 LCH**	**1000 LCH**
Masons Skilled	Village	Village	District	District
Masons Unskilled	Village	Village	Village	Village
Carpenters Skilled	Village	District	District	District
Carpenters Unskilled	Village	Village	Village	Village
trainers	Village	Village	Village	Village
supervisors	District	District	District	District
engineers	Region	Region	Region	Region
management staff	Region	Region	Region	Region
logistics		District	District	District
Accountant	Region	Region	Region	Region
Existing Village Based Organization (VBO) able to implement	Village	Village	Village	Village
Existing Community Based Organization (CBO) able to implement	Village	Village	Region	Region
Existing NGO or local organization able to implement	District	District	Region	Region
Etc…				

8. What can be done to increase the response capacities at the local level?

- Each of the community has their own construction techniques and materials for LCH. Some of them are very effective and scientific. These are sometimes overlooked during the making response on LCH. There is a gap in understanding the local knowledge for having effective design and technology for the constriction of LCH. For the reason, to fine the core local knowledge and demonstrate LCH from the view point.

9. Please comment on the issues stated below:

- Be careful, the RCC and Tin techniques actually ongoing in the field may be temporary solutions, this in relation to the energy crisis. There is already a tendency of people looking for alternative due to quality of tin reducing (with impact on life expectation). Due to energy crisis, people may not be able to offer it anymore in the future!!! Then, what will be the solutions?

- At the present situation our project goal to fine alternative way to using local and existing goods. Community knows better what they will be able to live. So that community meeting, community approach participation will be help to find the solutions.

- How can we help local existing knowledge to be saved / conserved/ improved, as it will not be necessary to reintroduce it in some decades, at it was the case in Europe recently…

- Participatory approach.
- Prove and using the local knowledge the existing materials strength to reducing disaster risk with community level.
- Use of local laborers, artisans and carpenters for the construction of LCH.
- Participatory design of houses.
- Strengthened community managed/capacity building processes for the construction of houses.
- More emphasis was put on the purchase and use of local materials for the construction of houses.
- Establishment of strong feedback system for house construction works.
- Train up the local unskilled labors.

- Our project has its responsibility in this field, for example, mud building not properly assessed in Mymensingh, artisans not invited, etc…

- It is necessary to have a training component in the prototype construction. If it is done under a contract, only one artisan (or few of them) will benefit from this learning experience. It will have a better impact if a strategy of training as many local artisans can be though while the prototype is constructed

- A sensitization component should be included in the field activities, Could be in direction of artisans and in direction of final client

- Take care with the relevance of the research protocols if there if any researches are handle in the field (Same exposure of compared solutions…).

- Water and Sanitation Component. Think about others issues such as livelihoods/ reforestation, etc…

- When analyzing the existing, think about the future? What will be the availability of material in 5, 50, 100 years?
  - After having overall learning and good practices on LCH, we got its roadmap for future LCH in Bangladesh. We are now very much interested to equip its disaster risk resilient LCH by using local materials, capacity and skills by contributing local economy, environment and culture. This will be help full for the preparation of different designs of LCH in different geographical and hazard specific contexts of Bangladesh.

- Bracing systems to be better exposed to engineers and trainees.

- Disaster preparedness component to be included during the training

- A small maintenance file to be provided to help beneficiaries to be aware of the specific maintenances requirements.

- CB to develop a team of trainers at district / regional level.

10. Develop a catalog of solutions:

Part of the building	Existing, strength and weaknesses	Improvement at low cost	Improvement at medium cost	Improvement at consistent cost
Fences	Organic material Low cost Available at local level Low life expectation, Roots after few years	Leave a space between fence bottom and ground Move to better organic material quality Fence in different layers in order to change the lower part easily and at low cost Insert a fired brick layers under the bottom of the fence (with space provided) to avoid erosion and moisture upraising.	Mat treatment at its bottom component Replacing bottom part of the fence by thin tin Replacing bottom part of the fence by thin treated tin Replacing bottom part of the fence by thick tin Replacing bottom part of the fence by thick treated tin	Move to thin tin for all fence Bottom treated Bottom with thik tin Treated Move to all with thick tin Bottom out of masonry 2 feet high. Etc…
Mud wall	Lift up with plinth Low cost Available at local level Confortable Not secured if water level raise up the plinth level Rats damage Maintenance issues Social recognition	Increase the plinth high Create another sacrificial material at the top of the plinth, with a step to move into the house (4'high?).	Face outside of walls with waterproof material (masonry) (1 feet foundation + 1 feet up to the plinth) Face inside and outside of walls with waterproof material) (1 feet foundation + 1 feet up to the plinth)	Create a basement under the whole supported wall (1 feet foundation + 1 feet up to the plinth) (1 feet foundation + 2 feet up to the plinth) (1 feet foundation + 3 feet up to the plinth)

Caritas Dhaka Region

Capacity Mapping for implementation of LCH

1. State the breakdown of material necessary for one Pilot LCH of each model / existing model then for 10, 100 and 1000 LCH:

Items	Need for 1 LCH	10 LCH	100 LCH	1000 LCH
Katla post	06 Nos	60 Nos	600 Nos	6,000 Nos
CC pillars	06 Nos	60 Nos	600 Nos	6,000 Nos
Wood pillars (untreated)	N/A	N/A	N/A	N/A
Wood pillars (treated)	N/A	N/A	N/A	N/A
Bamboo poles (untreated)	N/A	N/A	N/A	N/A
Bamboo poles (treated)	12 Nos	120 Nos	1,200 Nos	12,000 Nos
Structural bamboo	N/A	N/A	N/A	N/A
Non structural Bamboo	N/A	N/A	N/A	N/A
Bracing	16 Nos	160 Nos	1,600 Nos	16,000 Nos
Bamboo mat type 1	462 sft	4620 sft	46200	462000
Bamboo mat type 2	N/A	N/A	N/A	N/A
Tin & Ridging	Tin=8ft=27 nos,ridg=4 nos	Tin=8ft=270 nos,ridg=40 nos	Tin=8ft=2700 nos,ridg=400 nos	Tin=8ft=27000 nos,ridg= 4 00nos
Wooden planks	23.5	235	2350	23500
Wire for joining	N/A	N/A	N/A	N/A
Doors	1 No	10Nos	100Nos	1,000Nos
Windows	4 Nos	40 Nos	400 Nos	4,000 Nos
Nails 1.5inch to 5 inch	3 kg	30 kg	300 kg	3000 kg
Top Nails	3.5	35 Kg	350 kg	3500 kg
Karosin/ Digel	3 Litter	30 Litter	300 Litter	3000 Litter
Matia Oil	3 Litter	30 Litter	300 Litter	3000 Litter
Lock	1No	10Nos	100Nos	1000Nos
Hinge	22 Nos	220 Nos	2200 Nos	22000 Nos
Tower Bolt	06 Nos	60 Nos	600 Nos	6000 Nos
Nut Bolt with washer	40 Nos	400 Nos	4,000 Nos	40,000 Nos

2. State the availability of the material at the village / *upazila*/ district / region / country level:

In case we will need to supply a project for 1 / 10 / 100 / 1000 LCH, where will we need to order quantities and quality to be supplied in a 06 month period?

Note: V=Village, UZ=Upazila, D= District.

Items	1 LCH	10 LCH	100 LCH	1000 LCH
Katla post	V	V	UZ, D	Region Level
RCC pillars	V	V	UZ, D	Region Level
Wood pillars (untreated)	N/A	N/A	N/A	N/A
Wood pillars (treated)	N/A	N/A	N/A	N/A
Bamboo poles (untreated)	N/A	N/A	N/A	N/A
Bamboo poles (treated)	V	V	UZ, D	Regional
Structural bamboo	V	V	UZ,D	Regional
Non structural Bamboo	N/A	N/A	N/A	N/A
Bracing	V	V	UZ,D	Regional
Truss wood	V	UZ,D	UZ,D	Regional
Bamboo mat type 1	V	UZ,D	UZ,D	Regional
Bamboo mat type 2	N/A	N/A	N/A	N/A
Tin	V	UZ	UZ,D	Regional
Wooden planks	V	UZ	UZ,D	Regional
Wire for joining	N/A	N/A	N/A	N/A
Doors	V	UZ	UZ,D	Regional
Windows	V	UZ	UZ,D	Regional

Nails 1.5inch to 5 inch	V	UZ	UZ,D	Regional
Top Nails	V	UZ	UZ,D	Regional
Karosin/ Digel	V	UZ	UZ,D	Regional
Matia Oil	V	UZ	UZ,D	Regional
Lock	V	UZ	UZ,D	Regional
Hinge	V	UZ	UZ,D	Regional
Tower Bolt	V	UZ	UZ,D	Regional
Nut Bolt with washer	V	UZ	UZ,D	Regional

3. What could be the necessary action to improve the delivering capacities at the local level? In normal time, during disaster response? During disaster response, what will be the option if the identified supplying solutions are affected by the disaster?

- We may conduct skill development training for the community people especially those are available and interested to develop their skills.

- Insist local people to stock construction materials at their community level as preparation of disaster management.

- Prepare alternative means of transport to carry goods during disaster time according to their local context.

- Provide financial support to the specified group (which may formed by Caritas to monitor) to stock construction materials during disaster and normal time.

4. What will be the environmental impact of the supplying solution chosen?

- Tree plantation campaign will be launched in the local community. Planted trees will sustainable impact on environment.

- Insist local community to produce local resources such as bamboo, wood trees in their territory so then they can use environmental friendly materials for the construction so then in a particular time the scrap materials won't be harmful for the environment.

5. Who are the target group? Their strengths and weaknesses?

Local community people in the working area of Caritas Dhaka Region. Beneficiaries are specifically the poor and vulnerable and people with disabilities in the local communities. Especially, those do not have enough funds to extend their house or build their house, people those are living under poverty line and various barriers etc.

Strength:

- Have land to build home.
- Capable of hard work
- They can adapt with any situation
- They have idea on house making.
- They can engage in house making as man power.

Weakness:

- They do not have sufficient capital to build.
- They do not have own material of build home (natural resources such as bamboos, trees).
- They are not aware on the house making technique.
- Large family but insufficient of bread winners
- Lack of skills no training on house construction

6. Is there any potential to develop the use of some existing local material to answer the needs of the LCH projects? What will be the necessary action to be implemented?

Yes.

- By cultivate bamboo, wood trees, thatched leaves in the community are the potential local natural resources for LCH Project.

- Train community people especially those have interest in construction sector.

7. State the availability of the construction capacities as well as the project management capacity at the village level / district / region / country level:

In case we will need to construct 1 / 10 / 100 / 1000 LCH in a period of 6 month could we find the necessary human resources? Please identified organisms that can support for management and logistic.

Items	**1 LCH**	**10 LCH**	**100 LCH**	**1000 LCH**
Masons Skilled	V	V	V	UZ,D
Masons Unskilled	V	V	V	UZ,D
Carpenters Skilled	V	V	UZ,D	UZ,D

Carpenters Unskilled	V	V	V	V
trainers	UZ,D	UZ,D	UZ,D	UZ,D
supervisors	V	V	V	UZ,D
engineers	UZ,D	UZ,D	UZ,D	UZ,D , Region
management staff	Region Level	Region Level	Region Level	Region Level
logistics	UZ,D , Region	UZ,D, Region	UZ,D Region	Region Level
Accountant	Region Level	Region Level	Region Level	Region Level
Existing Village Based Organization (VBO) able to implement	V	V	UZ,D Region	Region Level
Existing Community Based Organization (CBO) able to implement	V	V	UZ,D Region	Region Level
Existing NGO or local organization able to implement	N/A	N/A	N/A	N/A
Etc…				

8. What can be done to increase the response capacities at the local level?

9. Please comment on the issues stated below:

- Be careful, the RCC and Tin techniques actually ongoing in the field may be temporary solutions, this in relation to the energy crisis. There is already a tendency of people looking for alternative due to quality of tin reducing (with impact on life expectation). Due to energy crisis, people may not be able to offer it anymore in the future!!! Then, what will be the solutions? How can we help local existing knowledge to be saved / conserved/ improved, as it will not be necessary to reintroduce it in some decades, at it was the case in Europe recently…

- Our project has its responsibility in this field, for example, mud building not properly assessed in Mymensingh, artisans not invited, etc…

  -Need artesian Training for improving the Knowledge about new technique of L.C.H.

- It is necessary to have a training component in the prototype construction. If it is done under a contract, only one artisan (or few of them) will benefit from this learning experience. It will have a better impact if a strategy of training as many local artisans can be though while the prototype is constructed

-We will agreed of training as the training is very effective for many local artisans can more expert be through while the prototype L.C.H.

- A sensitization component should be included in the field activities, Could be in direction of artisans and in direction of final client

-We agreed to have a sensitization with awareness programmed that will helpful for effective implementation of L.C.H.

- Take care with the relevance of the research protocols if there if any researches are handle in the field (Same exposure of compared solutions…).
  - Exposure visit may be helpful for improvement of L.C.H implementation.

- Water and Sanitation Component. Think about others issues such as livelihoods/ reforestation, etc…

  Yes. Water and Sanitation, livelihoods/ reforestation, Component should include in L.C.H. Construction.
- When analyzing the existing, think about the future? What will be the availability of material in 5, 50, 100 years?

    - L.C.H Construction materials are available in our working area.

- Bracing systems to be better exposed to engineers and trainees.

- Yes.

- Disaster preparedness component to be included during the training

- Yes.

- A small maintenance file to be provided to help beneficiaries to be aware of the specific maintenances requirements.

- Yes.

- CB to develop a team of trainers at district / regional level.

- Yes.

10. Develop a catalog of solutions:

Part of the building	Existing, strength and weaknesses	Improvement at low cost	Improvement at medium cost	Improvement at consistent cost
Poles	Bamboo Low cost Available at local level	Machete , Seasoning, water treatment. Embedded in plastic sheet Idem and surrounded salty sand or soil.	Oil treatment Katla RCC post	Katla post +Chemical treatment 14 Nos RCC Poles
Plinth	Mud Low cost Available at local level Low life expectation Rat and others frogs come inside the	Rammed it properly Lying with clay mud and Cow dong.	At Rainy Season Around the plinth Fencing Dry Grass and Polytheen sheet.	Around the plinth brick Flat soling and top of soling cement sand plaster

	house			
Fences	Low cost Available level Low life expectation, Roots after few Years	Jute stick with mud Laying	Muli Bamboo fencing top part and Lower part 2.5 ft CI Sheet fencing.	All fencing are CI Sheet fencing
Roof structure	Bamboo/Wood/ Tall wood Low cost Available level Low life expectation,	Four roofing house, all Roofing structure materials are use paka Bamboo	Four roofing house, all Roofing structure materials are use mature wood/Tall wood	Four roofing house, all Roofing structure materials are use Chemical Treatment and Standard Size wood/Tall wood
Roofing / roof cover	Use local materials Chon grass, grass straw as roofing cover. Durability is low one /two years only.	Mature Paddy strict, Chon grass by proper shorting.	Mature Paddy strict, Chon grass by proper chemical Treatment and shorting. 0.20 mm thick down C.G.I Sheet Use.	Use 0.28mm to 0.46mm thick C.G.I sheet.
Door window	One small window made by Grass/ Chon	Use one window and one door made by mulli Bamboo	Use two Windows and one Door proper Size made by thin plain CI Sheet and wood batten.	Use four Windows and one Door proper Size made by wood shutter and Frame.
Ceiling	No ceiling	Old cloth/ low cost new cloth ceiling	Use book and pit moli Bamboo dahra ceiling	Use only pit part moli Bamboo dhara ceiling and painting.

Caritas Dinajpur Region

Capacity Mapping for implementation of LCH

1. State the breakdown of material necessary for one Pilot LCH of each model / existing model then for 10, 100 and 1000 LCH:

Items	Need for 1 LCH	10 LCH	100 LCH	1000 LCH
Katla post	9	90	900	9000
RCC pillars	4	40	400	4000
Wood pillars (untreated)	-	-	-	-
Wood pillars (treated)	-	-	-	-
Bamboo poles (untreated)	9	90	900	9000
Bamboo poles (treated)	9	90	900	9000
Structural bamboo	8	80	800	8000
Non structural Bamboo	10	100	1000	10000
Bracing	12	120	1200	12000
Bamboo mat/fence type 1	191.75 Sft	1917.50 Sft	19,175 Sft	191750 Sft
Bamboo mat/fence type 2	120.75 Sft	1207.50 Sft	12075 sft	120750 sft
Tin & Ridging	9 Feet long 25 Pcs & 11 Pcs	9 Feet long 250 Pcs & 110 Pcs	9 Feet long 2500 Pcs & 1100 Pcs	9 Feet long 25000 Pcs & 11000 Pcs
Wooden planks	-			
Wire for joining	2 Kg	20 Kg	200 Kg	2000 Kg
Doors	1	10	100	1000
Windows	4	40	400	4000
Nails 1.5inch to 5 inch	5 Kg	50 Kg	500 Kg	5000 Kg
Top Nails	-	-	-	-
Karosin	3 Kg	30 Kg	300 Kg	3000 Kg
Matia Oil	-	-	-	-
Lock	1	10	100	1000
Hinge	40	400	4000	40000
Tower Bolt	-	-	-	-
Size Wood/Timber	25 Cft	250 Cft	2500 Cft	25000 Cft
CI Sheet fence	165 Sft	1650 Sft	16500 Sft	165000 Sft
Bricks	85 Pcs	850 Pcs	8500 Pcs	85000 Pcs
Tar	3 Kg	30 Kg	300 Kg	3000 Kg
Tin screw & washer	3 Kg	30 Kg	300 Kg	3000 Kg
Nut bolt	50 pcs	500 Pcs	5000 Pcs	50000 Pcs

2. State the availability of the material at the village / Upazila/ district / region / country level:

In case we will need to supply a project for 1 / 10 / 100 / 1000 LCH, where will we need to order quantities and quality to be supplied in a 06 month period?

Items	1 LCH	10 LCH	100 LCH	1000 LCH
Katla post	Upazila	Upazila	District	District
RCC pillars	Upazila	Upazila	District	District
Wood pillars (untreated)	-	-	-	-
Wood pillars (treated)	-	-	-	-
Bamboo poles (untreated)	Village	Village	Upazila	District
Bamboo poles (treated)	Village	Village	Upazila	District
Structural bamboo	Village	Village	Upazila	District
Non structural Bamboo	Village	Village	Upazila	District
Bracing	Upazila	Upazila	District	District
Bamboo mat type 1	Village	Village	Upazila	District
Bamboo mat type 2	Village	Village	Upazila	District
Tin/CI Sheet	Upazila	Upazila	District	District
Wooden planks	-			
Wire for joining	Upazila	Upazila	District	District
Doors	Upazila	Upazila	District	District
Windows	Upazila	Upazila	District	District
Nails	Upazila	Upazila	Upazila	District
Size Wood/Timber	Upazila	Upazila	District	District
CI Sheet fence	Upazila	Upazila	District	District
Bricks	Upazila	Upazila	Upazila	Upazila
Tar	Upazila	Upazila	Upazila	District
Tin screw & washer	Upazila	Upazila	District	District
Nut bolt	Upazila	Upazila	District	District

3. What could be the necessary action to improve the delivering capacities at the local level? In normal time, during disaster response? During disaster response, what will be the option if the identified supplying solutions are affected by the disaster?

- By Truck/Tractor and Van with carrying of materials at local level in normal time. During disaster period if road are damage at that time materials carrying by boat.

4. What will be the environmental impact of the supplying solution chosen?

- Air pollution

5. Who are the target group? Their strengths and weaknesses?

- During disaster affected people are the target group.

Strength:

- They are unity and take to decisions self.

Weakness:

- Lack of fund
- No skill on the Disaster preparedness.

6. Is there any potential to develop the use of some existing local material to answer the needs of the LCH projects? What will be the necessary action to be implemented?
- No, There are no potential materials in use of Pilot LCH.

7. State the availability of the construction capacities as well as the project management capacity at the village level / district / region / country level:

In case we will need to construct 1 / 10 / 100 / 1000 LCH in a period of 6 month could we find the necessary human resources? Please identified organisms that can support for management and logistic.

Items	1 LCH	10 LCH	100 LCH	1000 LCH
Masons Skilled	village level	village level	District level	Country level
Masons Unskilled	village level	village level	District level	Country level
Carpenters Skilled	village level	village level	District level	Country level
Carpenters Unskilled	village level	village level	District level	Country level
trainers	Region Level	Region Level	Region Level	Region Level
supervisors	Region Level	Region Level	Region Level	Region Level
engineers	Region Level	Region Level	Region Level	Region Level
management staff	Region Level	Region Level	Region Level	Region Level
logistics	Region Level	Region Level	Region Level	Region Level
Accountant	Region Level	Region Level	Region Level	Region Level
Existing Village Based Organization (VBO) able to implement	village level	village level	District level	Region Level
Existing Community Based Organization (CBO) able to implement	village level	village level	District level	Region Level
Existing NGO or local organization able to implement	village level	village level	District level	Region Level
Etc…				

8. What can be done to increase the response capacities at the local level?

- Good governance & Communication increased the local GOs & NGOs.

9. Please comment on the issues stated below:

- Be careful, the RCC and Tin techniques actually ongoing in the field may be temporary solutions, this in relation to the energy crisis. There is already a tendency of people looking for alternative due to quality of tin reducing (with impact on life expectation). Due to energy crisis, people may not be able to offer it anymore in the future!!! Then, what will be the solutions? How can we help local existing knowledge to be saved / conserved/ improved, as it will not be necessary to reintroduce it in some decades, at it was the case in Europe recently…

- Our project has its responsibility in this field, for example, mud building not properly assessed in Mymensingh, artisans not invited, etc…

- It is necessary to have a training component in the prototype construction. If it is done under a contract, only one artisan (or few of them) will benefit from this learning experience. It will have a better impact if a strategy of training as many local artisans can be though while the prototype is constructed

- A sensitization component should be included in the field activities, Could be in direction of artisans and in direction of final client

- Take care with the relevance of the research protocols if there if any researches are handle in the field (Same exposure of compared solutions…).

- Water and Sanitation Component. Think about others issues such as livelihoods/ reforestation, etc…

- When analyzing the existing, think about the future? What will be the availability of material in 5, 50, 100 years?

- Bracing systems to be better exposed to engineers and trainees.

- Disaster preparedness component to be included during the training

- A small maintenance file to be provided to help beneficiaries to be aware of the specific maintenances requirements.

- CB to develop a team of trainers at district / regional level.

10. Develop a catalog of solutions:

Part of the building	Existing, strength and weaknesses	Improvement at low cost	Improvement at medium cost	Improvement at consistent cost
Poles	Strength = Existing area = 4"×4" Ok Weakness = 5 mm MS rod were used	Improve the MS rod 6mm to 8 mm.	-	-
Plinth	Existing plinth height 1'-6" ok.	-	-	-
Fences	Strength side it were low cost and short time implement these work. Weakness side =	Improve the more fence quality and increased of Budget.	-	-

	Not more security and room is very cold in cold season.			
Roof structure	Existing design are ok	-	-	-
Roofing/roof cover	Existing roof cover are CI sheet and this activities continued.	-	-	-
Door window	Existing Door & windows are wooden and low quality.	Improve the quality and increased of Budget.	-	-
Ceiling	Existing ceiling made by bamboo fench.	Improve the quality and increased of Budget.	-	-

Field Officer (DMD)/Junior Program Officer (DMD) Program Officer (DMD)
Regional Director

Caritas Rajshahi Region

Capacity mapping for implementation of LCH

1. State the breakdown of material necessary for one Pilot LCH of each model-1(Mud Wall)then for 10, 100 and 1000 LCH:

Items	Need for 1 LCH	10 LCH	100 LCH	1000 LCH
Beti bar grass	200 kg	2000kg	200000kg	200000000kg
Bamboo for inside of the wall(treated)	20 nos	200 nos	20000 nos	20000000 nos
Sundried brick (mud block)	72 nos	720 nos	72000 nos	72000000 nos
Wooden door with hinges, lock, haze bolt all complete	2 nos	20 nos	2000 no	2000000 nos
Wooden window	4 nos	40 nos	4000 nos	4000000 nos
Bamboo post for verandah	4 nos	40 nos	4000 nos	4000000 nos
CC katla	4 nos	40 nos	4000 nos	4000000 nos
Bamboo for ceiling	40 no	400 nos	40000 nos	40000000 nos
Tie beam (Palm wood)	84 rft	840 rft	84000 rft	84000000 rft
Mud for ceiling	144 sft	1440 sft	144000 sft	144000000 sft
Buranga (Palm wood)	30 pitch	300 pitch	30000 pitch	30000000 pitch
Wall plat (Palm wood)	210 rft	2100 rft	210000 rft	210000000 rft
Rafter (Palm wood)	330 rft	3300 rft	330000 rft	330000000 rft
Wooden purlins	560 rft	5600 rft	560000 rft	560000000 rft
Wire for wall plat & Tie beam connected	5 kg	50 kg	5000 kg	5000000 kg
Nails 1.5inch to 6 inch	8 kg	80 kg	8000 kg	8000000 kg
Top Nails	4 kg	40 kg	4000 kg	4000000 kg
CGI sheet 0.28 mm 10 ft long	12 nos	120 no	12000 nos	12000000 nos
CGI sheet 0.28 mm 9ft	14 nos	140 nos	14000 nos	14000000 nos
CGI sheet 0.28 mm 6ft	36 nos	360 nos	36000 nos	37000000 nos
Ridge cover 0.20 mm	14 nos	140 nos	14000 nos	14000000 nos
Matia Oil	6 liter	60 liter	6000 liter	6000000 liter
Screw with washer	420 set	4200 set	420000 set	420000000 set

2. State the availability of the material at the village / *upazila*/ district / region / country level:

In case we will need to supply a project for 1 / 10 / 100 / 1000 LCH, where will we need to order quantities and quality to be supplied in a 06 month period?

Items	1 LCH	10 LCH	100 LCH	1000 LCH
Beti bar grass	Village	Village	Upazila	District
Bamboo for inside of the wall(treated)	Village	Village	Village	Upazila
Sundried brick (mud block)	Village	Village	Village	Village
Wooden door with hinges, lock, haze bolt all complete	Village	Village	Village	Upazila
Wooden window	Village	Village	Village	Upazila

Bamboo post for verandah	Village	Village	Village	Village
CC katla	Village	Village	Village	Upazila
Bamboo for ceiling	Village	Village	Upazila	District
Tie beam (Palm wood)	Village	Village	Upazila	District
Mud for ceiling	Village	Village	Village	Village
Buranga (Palm wood)	Village	Village	Upazila	District
Wall plat (Palm wood)	Village	Village	Upazila	District
Rafter (Palm wood)	Village	Village	Upazila	District
Wooden purlins	Village	Village	Upazila	District
Wire for wall plat & Tie beam connected	Upazila	Upazila	Upazila	Diatrict
Nails 1.5inch to 6 inch	Upazila	Upazila	Upazila	Diatrict
Top Nails	Upazila	Upazila	Upazila	Diatrict
CGI sheet 0.28 mm 10 ft long	District	Region	Region	Region
CGI sheet 0.28 mm 9ft	District	Region	Region	Region
CGI sheet 0.28 mm 6ft	District	Region	Region	Region
Ridge cover 0.20 mm	District	Region	Region	Region
Matia Oil	Upazila	Upazila	Upazila	Diatrict
Screw with washer	Upazila	Upazila	Upazila	District

3. What could be the necessary action to improve the delivering capacities at the local level? In normal time, during disaster response? During disaster response, what will be the option if the identified supplying solutions are affected by the disaster?

- Need assessment would be done.
- Disaster management committee will be form.
- Training will be arranged for the committee.
- Action plan will be done by the committee.
- Resource mapping will be done by the committee.
- Good communication build up with all suppliers.

4. What will be the environmental impact of the supplying solution chosen?

- Decreased plant which will be used as local materials.

5. Who are the target group? Their strengths and weaknesses?

- Effected poor community people will be targeted.

Strength:

- Caritas is working with them.
- Man power is available.
- Beti bar, bamboo and tree plant (for wood) have product in the area.
- Good communication.
- GO-NGO are work in the area.

Weakness:

- The community people have law awareness about disaster management.
- The community people are maximum poor.
- The poor people are day labor.
- They have law technologies and skill to build strong house through low cost.

6. Is there any potential to develop the use of some existing local material to answer the needs of the LCH projects? What will be the necessary action to be implemented?

- Awareness build up to the community.
- Take a long terms plan to locally production materials (Bamboo, Tree and Grass) at village level by the people.
- Train up local artisan to develop technique.

7. State the availability of the construction capacities as well as the project management capacity at the village level / district / region / country level: In case we will need to construct 1 / 10 / 100 / 1000 LCH in a period of 6 month could we find the necessary human resources? Please identified organisms that can support for management and logistic.

Items	**1 LCH**	**10 LCH**	**100 LCH**	**1000 LCH**
Masons Skilled	Village level	Upazila level	Upazila level	District level
Masons Unskilled	Village level	Village level	Upazila level	District level
Carpenters Skilled	Village level	Village level	Upazila level	District level
Carpenters Unskilled	Village level	Village level	Upazila level	Upazila level
trainers	Upazila level	Upazila level	Upazila level	Regional level
supervisors	Upazila level	Upazila level	Regional level	Regional level
engineers	Regional level	Regional level	Regional level	Regional level
management staff	Upazila level	Regional level	Regional level	Regional level
logistics	Regional level	Regional level	Regional level	Regional level
Accountant	Regional level	Regional level	Regional level	Regional level
Existing Village Based Organization (VBO) able to implement	Village level	Upazila level	Regional level	Regional level
Existing Community Based Organization (CBO) able to implement	Village level	Upazila level	Regional level	Regional level
Existing NGO or local organization able to implement	Village level	Upazila level	Regional level	Regional level
Etc…				

8. What can be done to increase the response capacities at the local level?

- Train up existing Village Based Organization (VBO), existing Community Based Organization (CBO) to developed response capacity.

9. Please comment on the issues stated below:

- Be careful, the RCC and Tin techniques actually ongoing in the field may be temporary solutions, this in relation to the energy crisis. There is already a tendency of people looking for alternative due to quality of tin reducing (with impact on life expectation). Due to energy crisis, people may not be able to offer it anymore in the future!!! Then, what will be the solutions? How can we help local existing knowledge to be saved / conserved/ improved, as it will not be necessary to reintroduce it in some decades, at it was the case in Europe recently…

  Local materials and local practice will be priority.

- Our project has its responsibility in this field, for example, mud building not properly assessed in Mymensingh, artisans not invited, etc…

  Local culture must be priority.

- It is necessary to have a training component in the prototype construction. If it is done under a contract, only one artisan (or few of them) will benefit from this learning experience. It will have a better impact if a strategy of training as many local artisans can be though while the prototype is constructed.

  OK

- A sensitization component should be included in the field activities, Could be in direction of artisans and in direction of final client.
  OK

- Take care with the relevance of the research protocols if there if any researches are handle in the field (Same exposure of compared solutions…).
  OK

- Water and Sanitation Component. Think about others issues such as livelihoods/ reforestation, etc…

  Water option and sanitary latrine installed from GO and NGO. Especially lateralization is easy but sanitization is a great challenge. So make a plan on Hygiene activities.

- When analyzing the existing, think about the future? What will be the availability of material in 5, 50, 100 years?

  Take long term plan to production local materials (beti bar, bamboo and tree)

- Bracing systems to be better exposed to engineers and trainees.
  OK

- Disaster preparedness component to be included during the training.
  OK

- A small maintenance file to be provided to help beneficiaries to be aware of the specific maintenances requirements.
  OK

- CB to develop a team of trainers at district / regional level.
  Ok

10. Develop a catalog of solutions:

Part of the building	Existing,		Improvement at low cost	Improvement at medium cost	Improvement at consistent cost
	Strength	**Weaknesses**			
RCC Pillars	Strong and longevity	Costly, Row materials are not available.	4''x4'' size pillar (1:2:4) 4.5 mm rod with 10 number wire used	4''x4'' size pillar (1:2:4) 6mm rod with 10 number wire used	Octagon size readymade pillar used
Bamboo Poles	Bamboo poles are local materials.	It is 2/3 years lasting.	Polythin used around the pole below ground level, Bitumen used around the pole below ground level.	Katla used bottom part of the pole and Chemical treatment.	Water treatment, used Mobil is paint.
Plinth	Mud plinth is traditionally used	Mud sleep in the rain water.	Beti bar mixed mud to be used to plinth.	Cement mixed mud to be used to plinth. 5'' brick work to done around the plinth	Mud with compacting and mud plaster.
Fences	Mud plinth is traditionally used	Mud sleep in the rain water.	Beti bar mixed mud to be used to wall.	Beti bar mixed mud to be used to wall with horizontally bamboo pitches are used as a reinforcement..	Mud with compacting and mud plaster.
Roof structure	Untreated wood and bamboo used	It is lasting 4/5 years, Joint and tie are normal.	Water treatment, used Mobil will be paint.	Bitumen and chemical used for treatment.	Normal wood and bamboo are used.
Roofing/roof cover	Tin is lasting, Betibar and straw roofing cost	Normal quality of tin is available in local market, Betibar and	Batibar and long straw will be used.	Painted tin will be used	Normal tin is used.

	low.	straw roofing are lasting only 2 years.			
Door window	Local materials and artisan available.	Small size door and window are used and not pained	Increased the size of door and window with paint	Qualitative wood will be used	Normal wood is used.
Ceiling	Mud ceiling is a good space as a store and to living with temperature decreased	Mud ceiling is costly. Bamboo chatai ceiling is used only store and temperature decreased	Treated wood and bamboo are combined use for mud ceiling and chatai ceiling.	Treated wood and bamboo are combined use for mud ceiling and chatai ceiling.	A few houses there are ceiling. But maximum house (poor family) there are not ceiling.

Field Officer(DMD) Program Officer (DMD)
Regional Director

Caritas Rajshahi Region Caritas Rajshahi Region
Caritas Rajshahi Region

Caritas Barisal Region

Capacity Mapping for implementation of LCH

1. State the breakdown of material necessary for one Pilot LCH of each model / existing model then for 10, 100 and 1000 LCH:

Items	Need for 1 LCH	10 LCH	100 LCH	1000 LCH
Katla post	8	80	800	8,000
RCC pillars(Main + Verandah)	8+4=12	120	1,200	12,000
Wood pillars (untreated)	-	-	-	-
Wood pillars (treated)	-	-	-	-
Bamboo poles (untreated)	9	90	900	9,000
Bamboo poles (treated)	6	60	600	6,000
Structural bamboo	8	80	800	8,000
Non structural Bamboo	-	-	-	-
Bracing	16	160	1,600	16,000
Bamboo mat/ Fence type 1	313.50 sft	3,135 sft	31,350 sft	313,500 sft
Bamboo mat/Fence type 2	190.50 sft	1,905 sft	19,050 sft	190,500 sft
Tin & Ridging	8'-0" long CGI Sheet - 30 Pcs 6'-0" long CGI Ridge - 10 Pcs	300 Pcs 100 Pcs	3,000 Pcs 1,000 Pcs	30,000 Pcs 10,000 Pcs
Wooden planks (Size Wood)	35.93 Cft	359.30 Cft	3,593 Cft	35,930 Cft
Wire for joining	18 No Wire 1 Kg	10 Kg	100 Kg	1,000 Kg
Doors	3'-0" x 6'-6" Size 1 No	10 Nos	100 Nos	1,000 Nos
Windows	2'-6"x 3'-0" Size 4 Nos	40 Nos	400 Nos	4,000 Nos
Nails 1.5 inch to 5 inch	8 Kgs	80 Kgs	800 Kgs	8,000 Kgs
Top Nails	12 Nos	120 Nos	1,200 Nos	12,000 Nos
Karosin	-	-	-	-
Matia Oil	4 Liters	40 Liters	400 Liters	4,000 Liters
Lock	1 No	10 Nos	100 Nos	1,000 Nos

Hinge	11 Nos	110 Nos	1,100 Nos	11,000 Nos
Tower Bolt	-	-	-	-
Mini Sign Board	1 No	10 Nos	100 Nos	1,000 Nos

2. State the availability of the material at the village / *upazila*/ district / region / country level:

In case we will need to supply a project for 1 / 10 / 100 / 1000 LCH, where will we need to order quantities and quality to be supplied in a 06 month period?

Items	1 LCH	10 LCH	100 LCH	1000 LCH
Katla post	Upazila	Upazila	Upazila/ District	District/ Other District
RCC pillars	Upazila	Upazila	Upazila/ District	District/ Other District
Wood pillars (untreated)	-	-	-	-
Wood pillars (treated)	-	-	-	-
Bamboo poles (untreated)	Village	Upazila	District	District
Bamboo poles (treated)	Village	Upazila	District	District
Structural bamboo	Village	Upazila	District	District
Non structural Bamboo	-	-	-	-
Bracing	Upazila	District	District /Other District	District/ Other District
Bamboo mat/ Fence type 1	Upazila	District	District/ Other District	District/ Other District
Bamboo mat/Fence type 2	Upazila	District	District/ Other District	District/ Other District
Tin & Ridging	Upazila	Upazila	District	Chittagong
Wooden planks(Size Wood)	Upazila	Upazila	Upazila/ District	District/ Other District
Wire for joining	Upazila	Upazila	Upazila	District
Doors	Upazila	Upazila	District	District/ Other District
Windows	Upazila	Upazila	District	District/ Other District
Nails	Upazila	Upazila	District	District/ Other District
Matia Oil	Upazila	Upazila	District	District/ Other District
Lock	Upazila	Upazila	District	District/ Other District
Hinge	Upazila	Upazila	District	District/ Other District
Tower Bolt	Upazila	Upazila	District	District/ Other District
Mini Sign Board	Upazila	Upazila	District	District/ Other District

3. What could be the necessary action to improve the delivering capacities at the local level? In normal time, during disaster response? During disaster response, what will be the option if the identified supplying solutions are affected by the disaster?

Caritas Barisal Region has the excellent experience to response in Disaster Situation. Considering the impact of disaster we may change the source and system to improve the delivering capacities. We have list of experienced vendors with in the region and out side the region also. We may communicate time to time with them for supply the essential materials for house construction if the local source are affected by disaster.

4. What will be the environmental impact of the supplying solution chosen?

Except Bamboo mat (Type 1 & type -2) not so major environmental impact will develop.

5. Who are the target group? Their strengths and weaknesses?

Poorest of the poor and the victims of disaster those who have no ability to re construct their damaged houses.

Strength:

- Can work with the artisan
- Indigenous knowledge can be used

Weakness:

- Target beneficiaries are from hand to mouth
- Want of skillness.

6. Is there any potential to develop the use of some existing local material to answer the needs of the LCH projects? What will be the necessary action to be implemented?

- Earth available for plinth construction.
- Parts of damaged houses may be used.

7. State the availability of the construction capacities as well as the project management capacity at the village level / district / region / country level: In case we will need to construct 1 / 10 / 100 / 1000 LCH in a period of 6 month could we find the necessary human resources? Please identified organisms that can support for management and logistic.

Items	**1 LCH**	**10 LCH**	**100 LCH**	**1000 LCH**
Masons Skilled	Village Level	Village /Upazila Level	District Level	Region Level
Masons Unskilled	Village Level	Village Level	Upazila Level	Region Level
Carpenters Skilled	Village Level	Upazila Level	District Level	Region Level
Carpenters Unskilled	Village Level	Village Level	District Level	Region Level
trainers	Region Level	Region Level	Region Level	Region Level
supervisors	Upazila Level	Region Level	Region Level	Region Level
engineers	Region Level	Region Level	Region Level	Region Level
management staff	Region Level	Region Level	Region Level	Region Level
logistics	Region Level	Region Level	Region Level	Region Level
Accountant	Region Level	Region Level	Region Level	Region Level
Existing Village Based Organization (VBO) able to implement	Yes	No	No	No
Existing Community Based Organization (CBO) able to implement	Yes	No	No	No
Existing NGO or local organization able to implement	Yes	Yes	No	No
Etc…				

8. What can be done to increase the response capacities at the local level?

- To form Strong Committees
- Provide Training
- Strong Supervision & Monitoring

9. Please comment on the issues stated below:

- Be careful, the RCC and Tin techniques actually ongoing in the field may be temporary solutions, this in relation to the energy crisis. There is already a tendency of people looking for alternative due to quality of tin reducing (with impact on life expectation). Due to energy crisis, people may not be able to offer it anymore in the future!!! Then, what will be the solutions? How can we help local existing knowledge to be saved / conserved/ improved, as it will not be necessary to reintroduce it in some decades, at it was the case in Europe recently…

- Our project has its responsibility in this field, for example, mud building not properly assessed in Mymensingh, artisans not invited, etc…
- It is necessary to have a training component in the prototype construction. If it is done under a contract, only one artisan (or few of them) will benefit from this learning experience. It will have a better impact if a strategy of training as many local artisans can be though while the prototype is constructed
- A sensitization component should be included in the field activities, Could be in direction of artisans and in direction of final client

- Take care with the relevance of the research protocols if there if any researches are handle in the field (Same exposure of compared solutions…).

- Water and Sanitation Component. Think about others issues such as livelihoods/ reforestation, etc…

- When analyzing the existing, think about the future? What will be the availability of material in 5, 50, 100 years?

- Bracing systems to be better exposed to engineers and trainees.

- Disaster preparedness component to be included during the training

- A small maintenance file to be provided to help beneficiaries to be aware of the specific maintenances requirements.

- CB to develop a team of trainers at district / regional level.

Generally we provide a water sealed latrine (5 rings + 1 Slab) with the hoses but to confirm fresh drinking water, it is cost effective as it is a low cost shelter.
Considering the situation we may use MS angle in lieu of timber if and where necessary. We may discuss at the time of training to the households and artisans about importance of bracing and to include disaster

preparedness component in training schedule. Also we may supply a hands out mentioning the small maintenance of the houses.

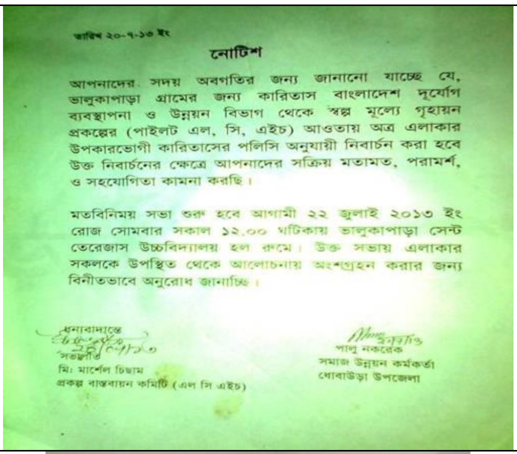
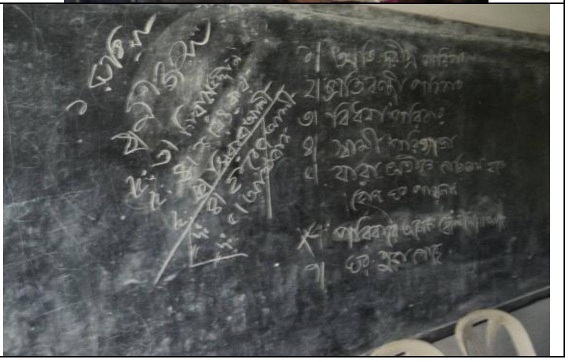
10. Develop a catalog of solutions:

Part of the building	Existing, strength and weaknesses	Improvement at low cost	Improvement at medium cost	Improvement at consistent cost
Poles	**Strength:** RCC Pillar of 1:2:4 ratio concrete mixing **Weaknesses:** In all cases curing not ensured	Curing to be ensured in all cases	-	-
Plinth	**Strength:** Height 1’-6” Standard. **Weaknesses:** Not protected (As CRS plinth protection model)	10% Cement can be mix with the mud of outer surface.	1-1/2” thick RCC with MS wire may used over the plinth	-
Fences	**Strength:** Low Cost **Weaknesses:** Rain water enter into the room. Cold in winter season.	Polythine Sheet may use inside the fence.	Only outer part of bamboo made tightly textured fence can be used	-
Roof structure	**Strength:** Durable and Local materials Used	-	-	-
Roofing/roof cover	**Strength:** Durable and beautiful	-	-	-
Door window	**Strength:** Considering Low cost house that are sufficient	-	-	-
Ceiling	No ceiling are considered in the budget.	-	-	-

Field Officer(DMD)/Junior Program Officer (DMD) Program Officer (DMD) Regional Director

Annexe 8 Community led beneficiaries selection

Pictorial Report:
Pilot LCH Project

Sl No.	Activities	Description of activities with shown in the photo	Showing in the photogaphs
1	Beneficiary Selection Process	Notice for cluster/community meeting	 তারিখ ২০-৭-১৩ ইং নোটিশ আপনাদের সদয় অবগতির জন্য জানানো যাচ্ছে যে, ভালুকাপাড়া গ্রামের জন্য কারিতাস বাংলাদেশ দূর্যোগ ব্যবস্থাপনা ও উন্নয়ন বিভাগ থেকে স্বল্প মূল্যে গৃহায়ন প্রকল্পের (পাইলট এল, সি, এইচ) আওতায় অত্র এলাকার উপকারভোগী কারিতাসের পলিসি অনুযায়ী নিবার্চন করা হবে উক্ত নিবার্চনের ক্ষেত্রে আপনাদের সক্রিয় মতামত, পরামর্শ, ও সহযোগিতা কামনা করছি। মতবিনিময় সভা শুরু হবে আগামী ২২ জুলাই ২০১৩ ইং রোজ সোমবার সকাল ১২.০০ ঘটিকায় ভালুকাপাড়া সেন্ট তেরেজাস উচ্চবিদ্যালয় হল রুমে। উক্ত সভায় এলাকার সকলকে উপস্থিত থেকে আলোচনায় অংশগ্রহন করার জন্য বিনীতভাবে অনুরোধ জানাচ্ছি। ধন্যবাদান্তে সভাপতি মিঃ মার্শেল চিছাম প্রকল্প বাস্তবায়ন কমিটি (এল সি এইচ) পালু নকরেক সমাজ উন্নয়ন কর্মকর্তা ধোবাউড়া উপজেলা
2	Beneficiary Selection Process	Cluster/community meeting	
2	Beneficiary Selection Process	Proposed criteria for beneficiary selection and proposed beneficiary written in the board	

4	Beneficiary Selection Process	Displayed feedback box	
5	Beneficiary Selection Process	Opened the feedback box	
6	Beneficiary Selection Process	Study the feedback in the project committee meeting	